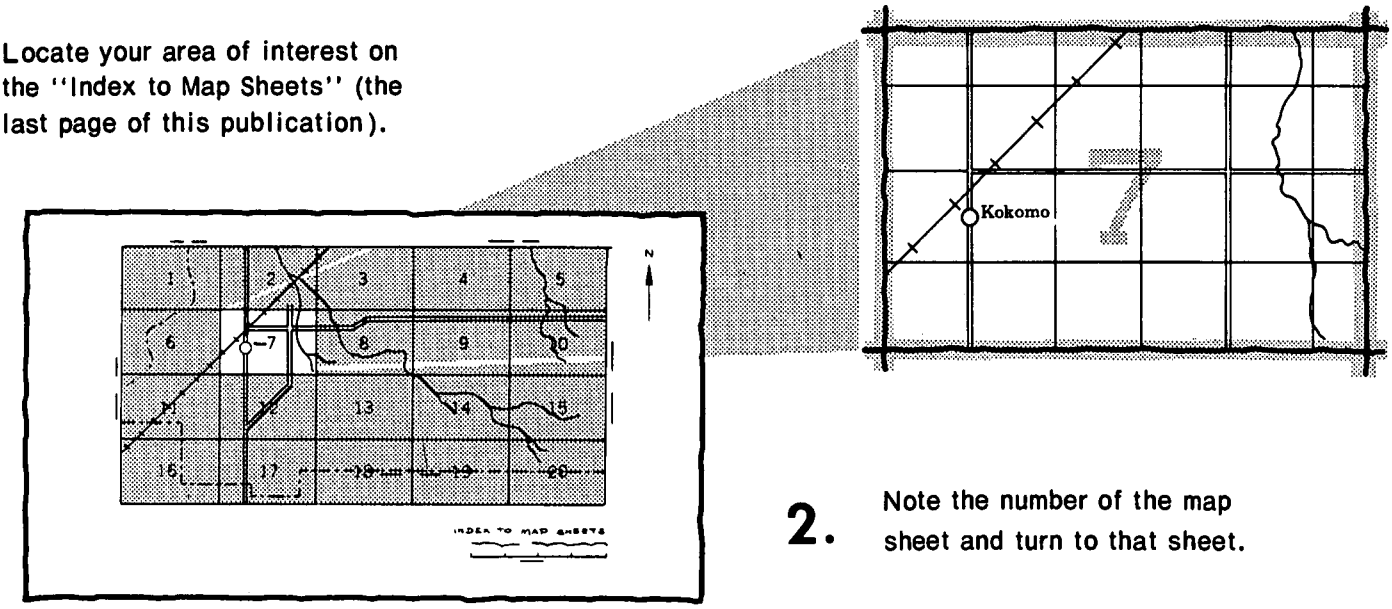
soil survey of

Charles Mix County South Dakota

United States Department of Agriculture
Soil Conservation Service
in cooperation with
United States Department of the Interior
Bureau of Indian Affairs and
South Dakota Agricultural Experiment Station

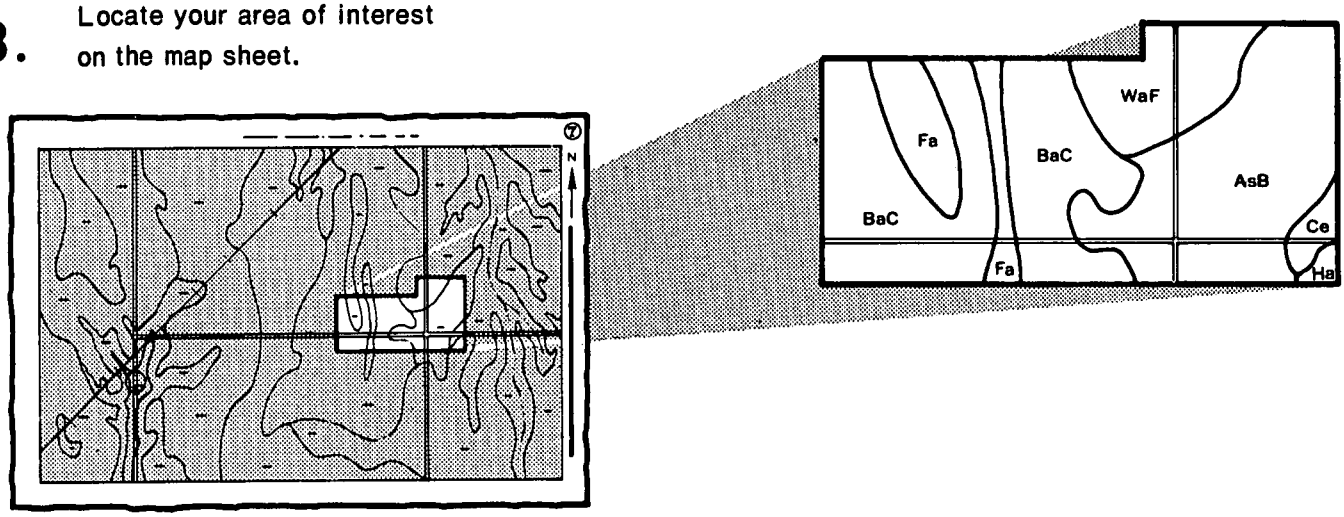
HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).



2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



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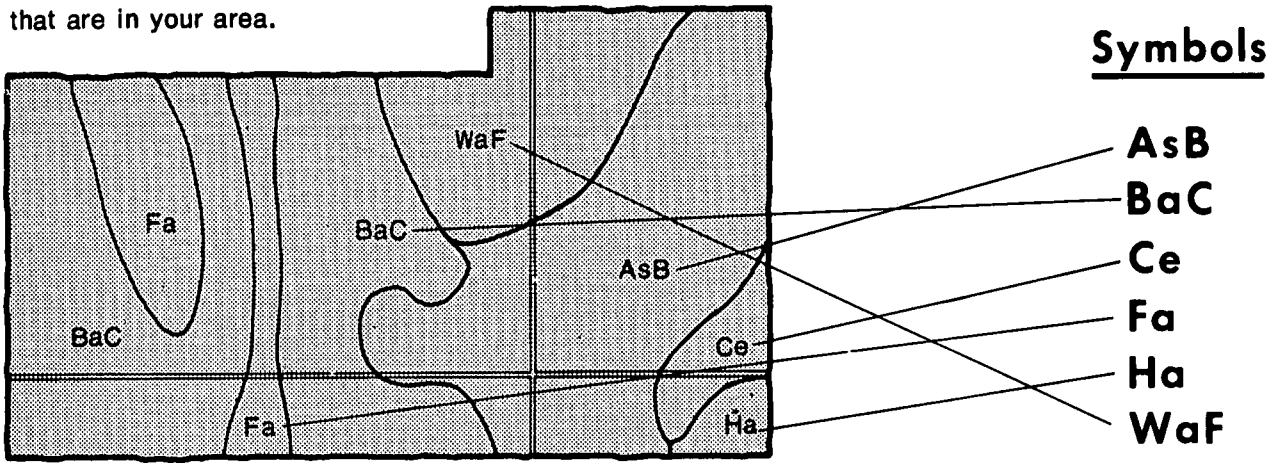
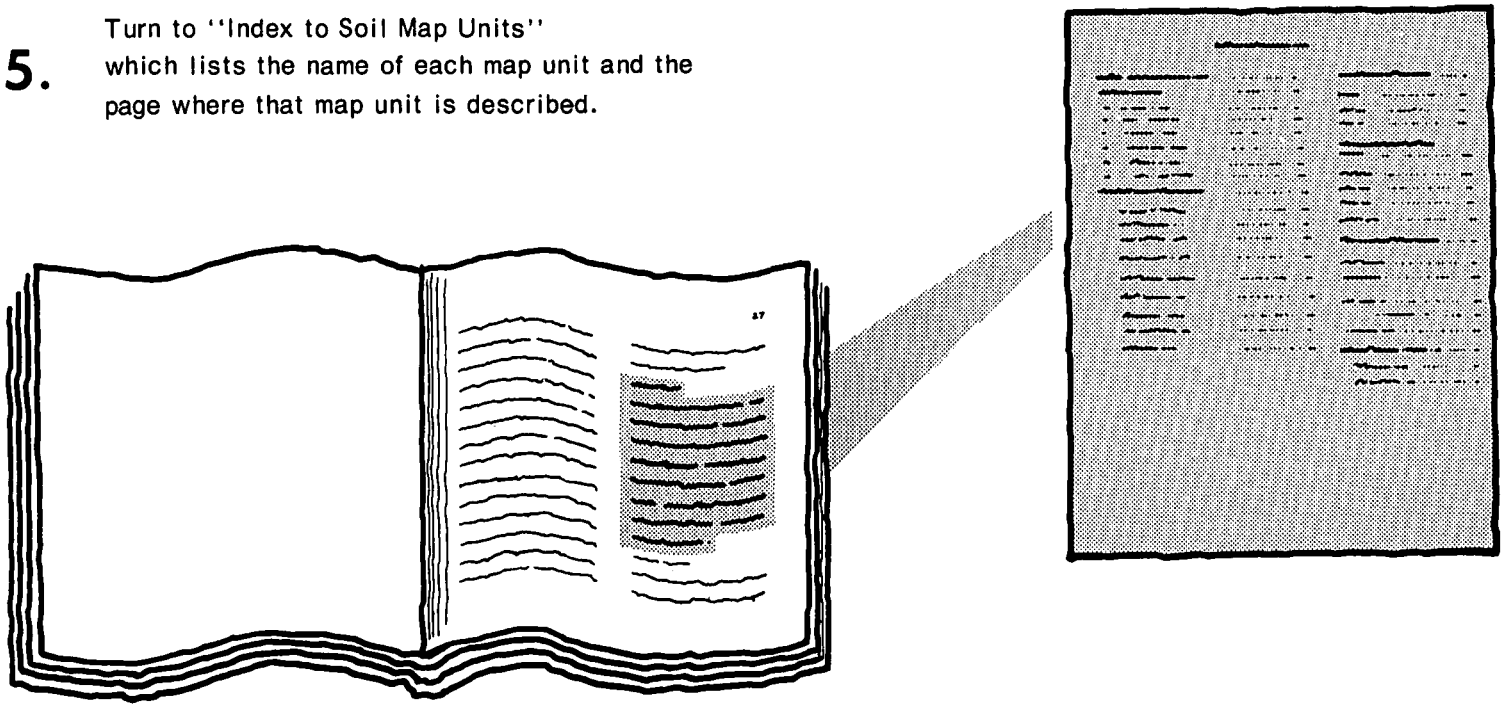
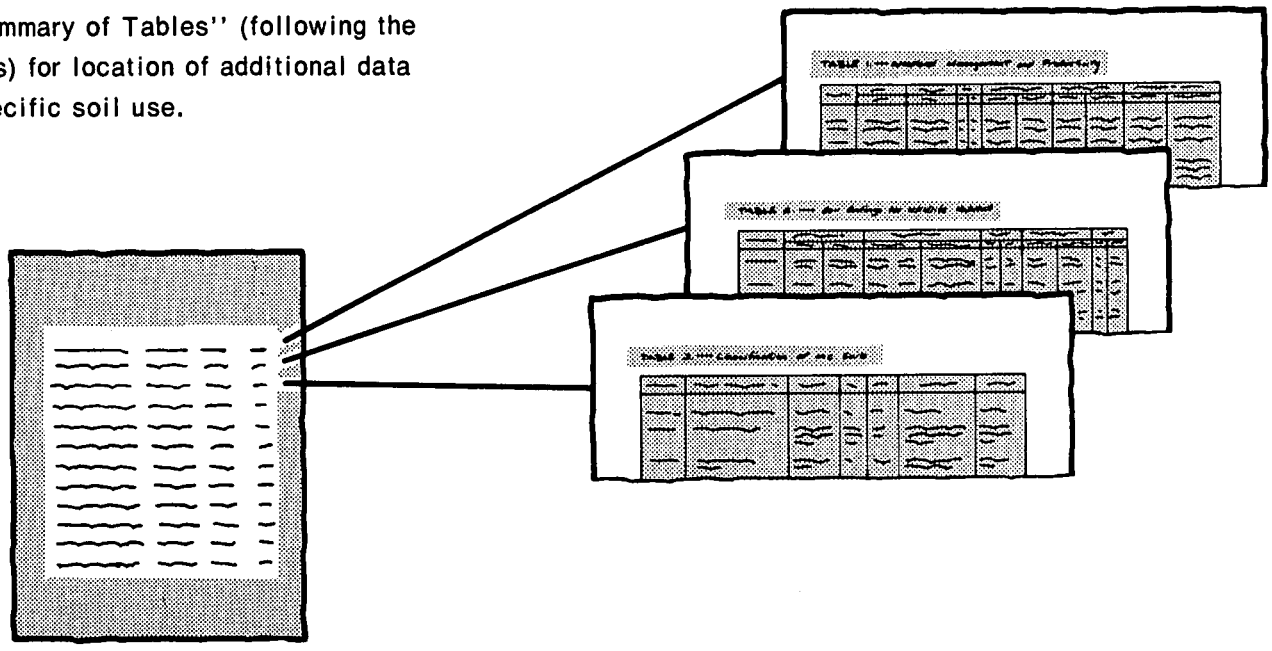


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; for specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

This survey was made cooperatively by the Soil Conservation Service; the United States Department of the Interior, Bureau of Indian Affairs; and the South Dakota Agricultural Experiment Station. It is part of the technical assistance furnished to the Charles Mix County Conservation District. Financial assistance was furnished by the South Dakota Department of Revenue and the Charles Mix County Commissioners. Major fieldwork was performed in the period 1975-79. Soil names and descriptions were approved in 1980. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1980.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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soil series

Issued February 1982

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foreword

This soil survey contains information that can be used in land-planning programs in Charles Mix County, South Dakota. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations inherent in the soil or hazards that adversely affect the soil, improvements needed to overcome the limitations or reduce the hazards, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

R. D. Swenson
State Conservationist
Soil Conservation Service

soil survey of
Charles Mix County, South Dakota

By Nilo G. Reber, Soil Conservation Service

Soils surveyed by Laurence L. Kobriger, Robert D. Nielsen, Nilo G. Reber
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United States Department of Agriculture, Soil Conservation Service
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CHARLES MIX COUNTY is in the south-central part of South Dakota (fig. 1). It has a total land area of 702,272 acres, or about 1,097 square miles. About 34,321 acres of the county is administered by the Bureau of Indian Affairs. This land is intermingled with private land throughout the county.

According to the 1970 census, the county has a population of 9,994. Lake Andes, the county seat, has a population of 948; Platte, in the northwestern part of the county, has one of 1,351; Geddes, in the central part, one of 308; and Wagner, in the eastern part, one of 1,655. Other villages in the county are Academy, Dante, Greenwood, Marty, Pickstown, and Ravinia. Only a few buildings and foundations mark the former village of Bovee.

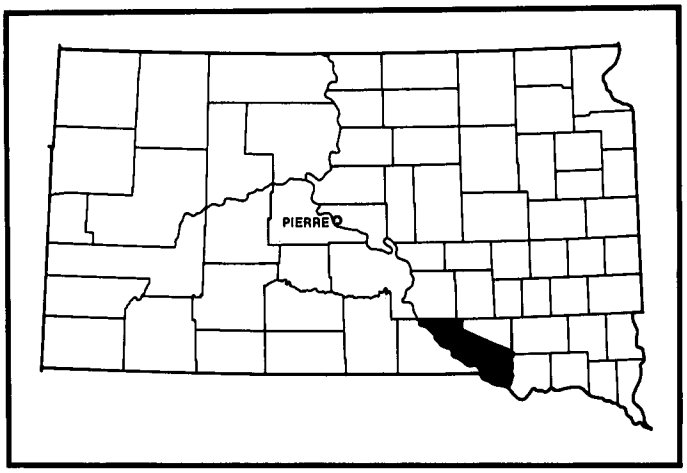

Figure 1.—Location of Charles Mix County in South Dakota.

general nature of the county

This section gives general information concerning the county. It describes climate; physiography, relief, and drainage; settlement; farming; and natural resources.

climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Charles Mix County is usually warm in summer, but hot spells are frequent and cool days occasional. The county is cold in winter, when arctic air frequently surges over the area. Most of the precipitation falls during the warm period, and rainfall is normally heaviest late in spring and early in summer. The average annual precipitation is as much as 3 inches less in the northwestern part of the county than in the southeastern part. In winter snowfall is blown into drifts, so that much of the ground is free of snow.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Pickstown, South Dakota, in the period 1951 to 1977. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 23 degrees F, and the average daily minimum temperature is 13 degrees. The lowest temperature on record, which occurred at Pickstown on January 29, 1966, is -28

degrees. In summer the average temperature is 74 degrees, and the average daily maximum temperature is 86 degrees. The highest recorded temperature, which occurred at Pickstown on July 13, 1957, is 111 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 21.55 inches. Of this, 17 inches, or 80 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 13 inches. The heaviest 1-day rainfall during the period of record was 3.55 inches at Pickstown on August 18, 1961. Thunderstorms occur on about 44 days each year, and most occur in summer. Tornadoes and severe thunderstorms strike occasionally. These storms are local in extent and of short duration and result in severe damage in narrow belts. Hailstorms occur occasionally in scattered small areas during the warmer part of the year.

Average seasonal snowfall is about 25 inches. The greatest snow depth at any one time during the period of record was 20 inches. On an average of 34 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 75 percent of the time possible in summer and 55 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 13 miles per hour, in spring.

physiography, relief, and drainage

Charles Mix County is within the Coteau du Missouri division of the Missouri Plateau (*4*). The Coteau du Missouri consists of gently rolling and hilly end moraines of the Mankato Substage of Wisconsin Glaciation and nearly level to undulating ground moraines. Much of the material deposited on the ground moraines is silty drift (*5*). The steep trench of the Missouri River is along the southwestern border of the county. Most of the breaks along the river are clayey and are underlain by Pierre shale. The flood plain along the Missouri River is inundated by Lake Francis Case above Fort Randall Dam.

Andes, Choteau, and Platte Creeks are the major drainageways. All of the drainageways in the county are intermittent and flow in the spring and after heavy rains. Except for Andes Creek, which drains into Lake Andes, they drain into Lake Francis Case or the Missouri River.

Elevation ranges from about 1,220 feet above sea level in the southeastern part of the county to about 2,130 feet in the northwestern part. The lowest elevation is on the flood plain along the Missouri River.

settlement

The first permanent settlers in the county, employees of the American Fur Company, arrived in 1830. In 1878, a small group of people started farming the flood plain along the Missouri River. The first large influx of settlers arrived in the spring of 1882. The next large group came in 1893, when surplus Indian land was sold (*6*).

Charles Mix County was established in 1862 by the first legislature held in Dakota Territory. It was named in honor of an early Commissioner of Indian Affairs. After several attempts, it was organized in 1879. The first county seat was Wheeler, which is now inundated by Lake Francis Case. The county seat was transferred to Lake Andes in 1916, after a vote by the county residents (*8*).

By 1890, the county had a population of 4,178. The population reached 16,703 in 1930. It declined to 11,785 by 1960 and 9,994 by 1970.

South Dakota State Highways 44, 45, 46, and 50 and United States Highways 18 and 281 are the main thoroughfares in the county. Most rural areas are served by all-weather roads to centers of trade. Small airports are at Lake Andes, Platte, and Wagner. Railroad transportation was extended into the county in 1900.

farming

Farming is the principal enterprise in the county. About 80 percent of the farm income is derived from the sale of livestock and livestock products. Many of the crops are used as feed for livestock. In 1974, farmland totaled 671,550 acres, which is about 94 percent of the total acreage of the county. The 1,110 farms averaged 605 acres in size (*7*). The average size has been increasing since the mid 1930's.

About 60 percent of the farmland is used for cultivated crops or for tame pasture and hay, and about 34 percent is range (*3*). Dryland farming is dominant, but some areas are irrigated. The main cropping system is row crops and small grain grown in rotation with legumes. Corn, grain sorghum, and oats are the main cultivated crops. Wheat and barley are also grown. The acreage planted to soybeans and sunflowers is increasing. Alfalfa and smooth bromegrass are the main crops grown for tame pasture and hay. According to the South Dakota Crop and Livestock Reporting Service, corn was grown on about 88,100 acres in 1978, oats on 68,300 acres, sorghum on 67,500 acres, barley on 10,800 acres, and wheat on 3,900 acres. The corn from 73,000 acres was harvested for grain. The rest was used for silage.

natural resources

Soil is the most important resource in the county. It provides a growing medium for cultivated crops and for the grass grazed by livestock. Other natural resources are ground water, wildlife, and sand and gravel.

Lake Francis Case and the Missouri River are excellent sources of water for domestic and industrial use and for irrigation. Many small dams, dugouts, and flows of Choteau and Platte Creeks provide water for livestock in most years. Ground water from wells is available in most parts of the county.

Significant deposits of sand and gravel are on the Delmont-Enet-Talmo association, which is described under the heading "General soil map units." Most of the sand and gravel has an excessive amount of fine rock fragments, such as shale, chalk, and clay ironstone, which make it unsuitable as concrete aggregate or as construction material. All of the sand and gravel can be used as subgrade material for roads and as bituminous aggregate. East of Pickstown, deposits of fine sand in areas of Meadin soils are suitable for the production of cement.

Coyote, cottontail, whitetail deer, and upland game birds, such as bobwhite, gray partridge, grouse, and ring-necked pheasant, are the chief wildlife resources. The wetlands provide wildlife production areas. Bass, bluegill, northern pike, perch, and other fish inhabit most of the permanent water areas. Lake Francis Case and the Missouri River provide excellent camping, fishing, and boating opportunities.

how this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied to a depth of 5 feet and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General soil map units" and "Detailed soil map units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, rangeland and woodland managers, engineers, planners, developers and builders, home buyers, and others.

general soil map units

The general soil map at the back of this publication shows the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, it consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The 14 associations in this county have been grouped for broad interpretative purposes. The associations and the groups are described on the pages that follow. The names of some associations do not agree with those on the general soil maps in the published soil surveys of adjacent Aurora, Douglas, and Hutchinson Counties. They do not fully agree because of changes in the application of the soil classification system.

soil descriptions

Nearly level to strongly sloping, silty and loamy soils on uplands and in upland swales

These soils dominantly are nearly level to gently rolling but are strongly sloping along some drainageways. They make up about 76 percent of the county. About 82 percent of the acreage is cropland. Corn, oats, alfalfa, and grain sorghum are the main crops. Some areas are irrigated.

1. Agar-Lowry association

Well drained, nearly level to strongly sloping, silty soils on uplands

This association is on uplands characterized by long, smooth slopes. The soils generally are nearly level to moderately sloping but are strongly sloping in places. In most areas the drainage pattern is well defined, but it is poorly defined in areas where small drainageways terminate in swales and small depressions.

This association makes up about 6 percent of the county. It is about 60 percent Agar soils, 25 percent Lowry soils, and 15 percent minor soils.

The Agar soils generally are higher on the landscape than the Lowry soils. Slopes range from 0 to 9 percent. Typically, the surface layer is dark grayish brown silt loam. The subsoil is dark grayish brown and pale brown silty clay loam. It is calcareous in the lower part. The underlying material is light brownish gray, calcareous silty clay loam and silt loam.

The Lowry soils generally are lower on the landscape than the Agar soils. Slopes range from 0 to 15 percent. Typically, the surface layer is dark grayish brown silt loam. The subsoil is dark grayish brown and grayish brown silt loam. It is calcareous in the lower part. The underlying material is brown, pale brown, and dark grayish brown, calcareous silt loam.

Minor in this association are Eakin soils on ridges, the moderately well drained Mobridge soils in swales, the light colored Sully soils on the crest of ridges and the sides of entrenched drainageways, and the poorly drained Tetonka soils in depressions. The Eakin soils are underlain by glacial till.

About 90 percent of this association is cropland. Corn, small grain, grain sorghum, and alfalfa are the main crops. Some areas are irrigated. Some areas support native grass and are used for grazing or hay. Conserving moisture and controlling erosion are the main concerns in managing cultivated areas.

The major soils are well suited to cultivated crops and to tame pasture and hay, range, openland wildlife habitat, building site development, recreational development, and septic tank absorption fields.

2. DeGrey-Walke association

Moderately well drained, nearly level, silty soils on uplands

This association is on uplands characterized by slight rises, shallow swales, and depressions. The drainage pattern is poorly defined.

This association makes up about 4 percent of the county. It is about 45 percent DeGrey soils, 35 percent Walke soils, and 20 percent minor soils.

The DeGrey soils are in plane or slightly concave areas. In this association they have a slope of 0 to 2 percent. Typically, the surface layer is dark grayish brown and grayish brown silt loam. The subsoil is dark

grayish brown and light olive brown silty clay and silty clay loam. It is calcareous in the lower part. The underlying material also is calcareous. It is light olive brown silty clay loam over grayish brown clay loam.

The Walke soils are in plane or slightly convex areas. Slopes range from 0 to 2 percent. Typically, the surface layer is dark gray and dark grayish brown silt loam. Below this is a transitional layer of grayish brown and gray silty clay loam. The subsoil is dark grayish brown and grayish brown silty clay. It is calcareous in the lower part. The underlying material also is calcareous. It is light yellowish brown silty clay loam over pale yellow clay loam.

Minor in this association are the well drained Eakin soils on low ridges, the poorly drained Hoven soils in depressions, and the moderately well drained Onita soils in swales.

About 75 percent of this association is cropland. Small grain, grain sorghum, and alfalfa are the main crops. Because of the sodium affected subsoil in the major soils, improving tilth and increasing the water intake rate are the main concerns in managing cultivated areas.

This association is poorly suited to cultivated crops, openland wildlife habitat, and tame pasture and hay. It is fairly well suited to range. It is suitable for building site development, but a high shrink-swell potential in the major soils is a limitation. These soils are poorly suited to septic tank absorption fields because of restricted permeability.

3. Eakin-DeGrey association

Well drained and moderately well drained, nearly level to undulating, silty soils on uplands

This association is on uplands characterized by gentle rises, slight swales, and depressions. In most areas the drainage pattern is poorly defined, but it is well defined along the larger drainageways. Scattered stones are on the surface in some areas.

This association makes up about 3 percent of the county. It is about 55 percent Eakin soils, 25 percent DeGrey soils, and 20 percent minor soils.

The well drained Eakin soils are on slight rises. In this association they have a slope of 2 to 4 percent. Typically, the surface layer is dark grayish brown silt loam. The subsoil is grayish brown and light olive brown silty clay loam. It is calcareous in the lower part. The underlying material is pale olive, calcareous clay loam.

The moderately well drained DeGrey soils are in plane or slightly concave areas. In this association they have a slope of 0 to 2 percent. Typically, the surface layer is dark grayish brown and grayish brown silt loam. The subsoil is dark grayish brown and light olive brown silty clay and silty clay loam. It is calcareous in the lower part. The underlying material also is calcareous. It is light olive brown silty clay loam over grayish brown clay loam.

Minor in this association are the calcareous, loamy Ethan soils on the higher ridges and on side slopes along large drainageways, the poorly drained Hoven and Tetonka soils in depressions, and the moderately well drained Onita soils in swales.

About 70 percent of this association is cropland. Small grain, grain sorghum, and alfalfa are the main crops. Controlling erosion, improving tilth, and increasing the water intake rate are the main concerns in managing cultivated areas.

This association is well suited to range, rangeland wildlife habitat, and tame pasture and hay. It is suitable for building site development, but a moderate shrink-swell potential in the Eakin soils and a high shrink-swell potential in the DeGrey soils are limitations. The Eakin soils are only fairly well suited and the DeGrey soils poorly suited to septic tank absorption fields because of restricted permeability.

4. Eakin-Highmore-Ethan association

Well drained, nearly level to gently rolling, silty and loamy soils on uplands

This association is on uplands characterized by gentle rises, swales, and depressions. Slopes generally are nearly level and undulating but are steeper along the drainageways. The drainage pattern is poorly defined in areas where drainageways terminate in small depressions, but it is well defined along the larger drainageways. Scattered stones are on the surface in some areas.

This association makes up about 30 percent of the county. It is about 40 percent Eakin soils, 20 percent Highmore soils, 15 percent Ethan soils, and 25 percent minor soils (fig. 2).

The Eakin soils are on convex and smooth slopes. Slopes range from 0 to 9 percent. Typically, the surface layer is dark grayish brown silt loam. The subsoil is grayish brown and light olive brown silty clay loam. It is calcareous in the lower part. The underlying material is pale olive, calcareous clay loam.

The Highmore soils are on smooth slopes. Slopes range from 0 to 6 percent. Typically, the surface layer is dark grayish brown silt loam. The subsoil is dark grayish brown, dark brown, and light yellowish brown silty clay loam. It is calcareous in the lower part. The underlying material is light yellowish brown, calcareous silty clay loam and clay loam.

The Ethan soils are on convex slopes. In this association they have a slope of 2 to 9 percent. Typically, the surface layer is dark grayish brown, calcareous loam. The subsoil is dark grayish brown and light gray, calcareous loam. The underlying material is light gray, calcareous clay loam.

Minor in this association are the calcareous Betts soils on knolls and ridges; the well drained, loamy Clarno soils in positions on the landscape similar to those of the Ethan soils; the moderately well drained DeGrey and Walke soils in slightly concave areas and on foot slopes; the poorly drained Hoven and Tetonka and very poorly

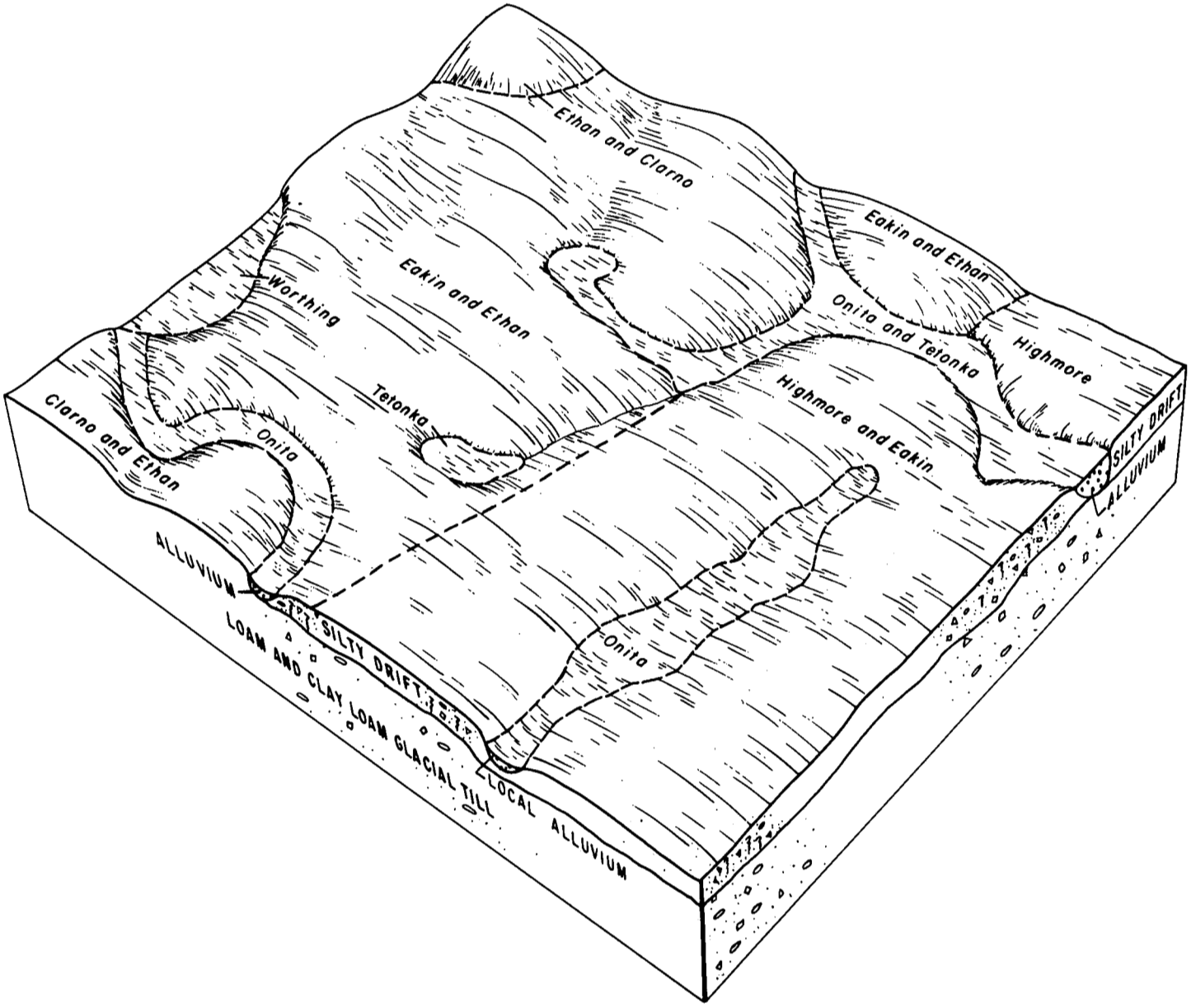

Figure 2.—Pattern of soils and parent material in the Eakin-Highmore-Ethan association.

drained Worthing soils in depressions; and the moderately well drained Onita soils in swales.

About 77 percent of this association is cropland. Corn, small grain, grain sorghum, and alfalfa are the main crops. Some areas are irrigated. Some areas support native grass and are used for grazing or hay. Controlling erosion and conserving moisture are the main concerns in managing cultivated areas.

The major soils are well suited to cultivated crops and to tame pasture and hay, rangeland, and openland and rangeland wildlife habitat. They are only fairly well suited to most kinds of building site development because of a moderate shrink-swell potential and to septic tank absorption fields because of restricted permeability. The likelihood of seepage limits the Highmore and Ethan soils as sites for other sanitary facilities.

5. Highmore-Eakin association

Well drained, nearly level to undulating, silty soils on uplands

This association is on uplands characterized by smooth slopes, gentle rises, and swales. In most areas drainageways terminate in small depressions. The drainage pattern is poorly defined in these areas, but it is well defined along the larger drainageways.

This association makes up 22 percent of the county. It is about 55 percent Highmore soils, 20 percent Eakin soils, and 25 percent minor soils.

The Highmore soils are on smooth slopes. Slopes range from 0 to 6 percent. Typically, the surface layer is dark grayish brown silt loam. The subsoil is dark grayish brown, dark brown, and light yellowish brown silty clay loam. It is calcareous in the lower part. The underlying material is light yellowish brown, calcareous silty clay loam and clay loam.

The Eakin soils are on rises and other convex slopes. In this association they have a slope of 0 to 6 percent. Typically, the surface layer is dark grayish brown silt loam. The subsoil is grayish brown and light olive brown silty clay loam. It is calcareous in the lower part. The underlying material is pale olive, calcareous clay loam.

Minor in this association are the moderately well drained DeGrey and Walke soils in slightly concave areas; the calcareous, loamy Ethan soils on knolls and ridges; the Lane soils on foot slopes and terraces; the moderately well drained Onita soils in swales; and the poorly drained Tetonka soils in depressions. The DeGrey and Walke soils have a sodium affected subsoil. The Lane soils are dark to a depth of more than 20 inches.

About 90 percent of this association is cropland. Corn, small grain, grain sorghum, and alfalfa are the main crops. Some areas are irrigated. Conserving moisture and controlling erosion are the main concerns in managing cultivated areas.

This association is well suited to cultivated crops and to tame pasture and hay, range, and openland and rangeland wildlife habitat. The major soils are only fairly well suited to most kinds of building site development because of a moderate shrink-swell potential and to septic tank absorption fields because of restricted permeability. The likelihood of seepage limits the Highmore soils as sites for other sanitary facilities.

6. Homme-Ethan-Onita association

Well drained and moderately well drained, nearly level to gently rolling, silty and loamy soils on uplands and in upland swales

This association is on uplands characterized by many shallow swales. Slopes generally are undulating but are steeper along drainageways and are less steep on flats and in the swales. The drainage pattern is poorly defined in areas where the drainageways terminate in small depressions. It is well defined, however, along the larger drainageways.

This association makes up about 6 percent of the county. It is about 40 percent Homme soils, 25 percent Ethan soils, 20 percent Onita soils, and 15 percent minor soils.

The well drained Homme soils are on mid slopes and broad flats. Slopes range from 0 to 9 percent. Typically, the surface layer is very dark grayish brown silty clay loam. The subsoil is dark brown, brown, and pale brown silty clay loam. It is calcareous in the lower part. The underlying material is light yellowish brown, calcareous clay loam.

The well drained Ethan soils are on convex slopes. In this association they have a slope of 2 to 9 percent. Typically, the surface layer is dark grayish brown, calcareous loam. The subsoil is dark grayish brown and light gray, calcareous loam. The underlying material is light gray, calcareous clay loam.

The moderately well drained Onita soils are on flats and in slightly concave swales. Slopes range from 0 to 2 percent. Typically, the surface layer is dark gray silty clay loam. The subsoil is dark grayish brown and grayish brown silty clay loam. It is calcareous in the lower part. The underlying material also is calcareous. It is yellowish brown silty clay loam over light brownish gray clay loam.

Minor in this association are the calcareous Betts soils on the higher ridges and slopes along entrenched drainageways; the poorly drained Tetonka and very poorly drained Worthing soils in depressions; and the moderately well drained Walke soils, which have a sodium affected subsoil and occur as areas intermingled with some areas of the Homme soils.

About 87 percent of this association is cropland. Corn, small grain, and alfalfa are the main crops. The steeper areas along the larger drainageways support native grass and are used for grazing. Conserving moisture, maintaining fertility, and controlling erosion are the main concerns in managing the major soils for crops.

The major soils are well suited to cultivated crops and to tame pasture and hay, range, and openland and rangeland wildlife habitat. The Homme and Ethan soils are only fairly well suited to most kinds of building site development because of a moderate or high shrink-swell potential and to septic tank absorption fields because of restricted permeability. The Onita soils generally are unsuitable as sites for buildings and septic tank absorption fields because they are subject to flooding.

7. Highmore-Walke association

Well drained and moderately well drained, nearly level and gently undulating, silty soils on uplands

This association is on uplands characterized by gentle rises, slight swales, and depressions. The drainage pattern is poorly defined.

This association makes up about 3 percent of the county. It is about 50 percent Highmore soils, 30 percent Walke soils, and 20 percent minor soils.

The well drained Highmore soils are in the higher smooth areas. In this association they have a slope of 0 to 2 percent. Typically, the surface layer is dark grayish brown silt loam. The subsoil is dark grayish brown, dark brown, and light yellowish brown silty clay loam. It is

calcareous in the lower part. The underlying material is light yellowish brown, calcareous silty clay loam and clay loam.

The moderately well drained Walke soils are in plane or slightly concave areas. They have a sodium affected subsoil. Slopes range from 0 to 2 percent. Typically, the surface layer is dark gray and dark grayish brown silt loam. Below this is a transitional layer of grayish brown and gray silty clay loam. The subsoil is dark grayish brown and grayish brown silty clay. It is calcareous in the lower part. The underlying material also is calcareous. It is light yellowish brown silty clay loam over pale yellow clay loam.

Minor in this association are the moderately well drained DeGrey soils in small plane areas and depressions; the well drained, calcareous, loamy Ethan soils on knolls and ridges; the moderately well drained Onita soils in swales; and the poorly drained Hoven and Tetonka and very poorly drained Worthing soils in depressions. The DeGrey soils have a sodium affected subsoil.

About 85 percent of this association is cropland. Corn, small grain, grain sorghum, and alfalfa are the main crops. Conserving moisture, improving tilth, and increasing the water intake rate are the main concerns of management if the major soils are cropped.

This association is only fairly well suited to cultivated crops and to openland wildlife habitat. It is well suited to tame pasture and hay, range, and rangeland wildlife habitat. It is suitable for building site development, but a moderate shrink-swell potential in the Highmore soils and a high shrink-swell potential in the Walke soils are limitations. The Highmore soils are only fairly well suited and the Walke soils poorly suited to septic tank absorption fields because of restricted permeability.

8. Beadle-Eakin association

Well drained, nearly level to gently rolling, loamy and silty soils on uplands

This association is on uplands characterized by slight rises, ridges, swales, and depressions. Slopes generally are undulating but are steeper along drainageways and are less sloping in other areas. In most areas drainageways terminate in small depressions. The drainage pattern is poorly defined in these areas, but it is well defined along the larger drainageways. Scattered stones are on the surface of the Beadle soils.

This association makes up about 2 percent of the county. It is about 45 percent Beadle soils, 35 percent Eakin soils, and 20 percent minor soils.

The Beadle soils are on slight rises, side slopes, and ridges. Slopes range from 0 to 9 percent. Typically, the surface layer is dark grayish brown loam. The subsoil is dark grayish brown and grayish brown clay loam. It is calcareous in the lower part. The underlying material is light brownish gray, calcareous clay loam.

The Eakin soils are on side slopes and in nearly level areas. Slopes range from 0 to 9 percent. Typically, the surface layer is dark grayish brown silt loam. The subsoil is grayish brown and light olive brown silty clay loam. It is calcareous in the lower part. The underlying material is pale olive, calcareous clay loam.

Minor in this association are the moderately well drained DeGrey and Walke soils on flats and in slightly concave areas, the poorly drained Hoven and Tetonka soils in depressions, the moderately well drained Jerauld soils on side slopes and in swales, and the moderately well drained Onita soils in swales. The subsoil in the DeGrey, Walke, and Jerauld soils is sodium affected. The one in the Jerauld soils is near the surface.

About 65 percent of this association is cropland. Small grain, grain sorghum, and alfalfa are the main crops. Some of the steeper areas and the areas where depressions are common support native grass and are used for grazing. Conserving moisture, controlling erosion, and improving tilth in the Beadle soils are the main concerns in managing cultivated areas.

The Beadle soils are only fairly well suited and the Eakin soils well suited to cultivated crops and to tame pasture and hay. Both of the major soils are well suited to range and rangeland wildlife habitat. They are suitable for building site development, but a high shrink-swell potential in the Beadle soils and a moderate shrink-swell potential in the Eakin soils are limitations. The Beadle soils are poorly suited and the Eakin soils only fairly well suited to septic tank absorption fields because of restricted permeability.

Level and nearly level, silty and clayey soils on flood plains and terraces

These soils make up about 2 percent of the county. About 85 percent of the acreage is cropland. Corn, oats, alfalfa, and grain sorghum are the main crops. Some areas are irrigated.

9. Bon association

Moderately well drained, nearly level, silty soils on flood plains and low terraces

This association is on flood plains and low stream terraces that are dissected by meandering channels. The drainage pattern is poorly defined in all areas, except for those near the channels.

This association makes up about 1 percent of the county. It is about 80 percent Bon soils and 20 percent minor soils.

The Bon soils have a slope of 0 to 2 percent. Typically, the surface layer is dark grayish brown silt loam. The subsurface layer is dark gray silt loam. The underlying material is light brownish gray, pale brown, and gray, stratified, calcareous loam and fine sandy loam.

Minor in this association are the well drained Betts soils on the steeper embankments adjacent to the flood plains, the Onita soils on the foot slopes of adjacent uplands, and the poorly drained Napa and Salmo soils in slightly concave areas. The Onita soils are not stratified.

About 85 percent of this association is cropland. Corn, small grain, grain sorghum, and alfalfa are the main crops. Some areas support native grass and are used for grazing. Excess water in the spring and a scarcity of moisture during dry periods are the main concerns of management.

This association is well suited to cultivated crops and to tame pasture and hay, range, and openland wildlife habitat. It generally is unsuited to building site development and sanitary facilities because it is subject to flooding.

10. Albaton-Aowa-Haynie association

Poorly drained, moderately well drained, and well drained, level and nearly level, clayey and silty soils on flood plains

This association is on the flood plain along the Missouri River. Narrow, low ridges and oxbows are in a few areas. Surface drainage systems have been installed in some areas. The soils are protected from flooding because Fort Randall Dam holds back the potential floodwater in the river.

This association makes up about 1 percent of the county. It is about 40 percent Albaton soils, 20 percent Aowa soils, 20 percent Haynie soils, and 20 percent minor soils.

The poorly drained Albaton soils are on broad flats and in slightly concave old channels. Slopes are less than 1 percent. Typically, the surface layer is grayish brown, calcareous silty clay. The underlying material is light brownish gray, stratified, calcareous silty clay, clay, silty clay loam, and silt.

The moderately well drained Aowa soils are on broad flats slightly higher on the flood plain than those occupied by the Albaton soils. Slopes range from 0 to 2 percent. Typically, the surface layer is grayish brown silty clay loam. The subsurface layer is grayish brown, stratified silty clay loam and silt loam. The underlying material is pale brown, brown, and light brownish gray, stratified, calcareous silt loam and silty clay loam.

The well drained Haynie soils are on low rises and ridges. Slopes range from 0 to 2 percent. Typically, the surface layer is grayish brown, calcareous silt loam. The underlying material is light brownish gray and pale brown, stratified, calcareous silt loam and very fine sandy loam.

Minor in this association are the somewhat excessively drained, sandy Inavale soils and the well drained, loamy Munjor soils. These soils are nearer the river than the major soils.

About 80 percent of this association is cropland. Alfalfa, corn, grain sorghum, small grain, and soybeans are the main crops. Some areas support native grasses and an overstory of deciduous trees. They are used for grazing and wildlife habitat. Controlling wind erosion, conserving moisture, and reducing the wetness of the Albaton soil are the main concerns of management.

The Albaton soils are fairly well suited and the Aowa and Haynie soils well suited to cultivated crops and to tame pasture and hay and openland wildlife habitat. All three soils are well suited to range. The Albaton soils generally are unsuited to building site development and sanitary facilities because of wetness. The Aowa and Haynie soils are well suited to building site development. The Haynie soils are well suited to septic tank absorption fields, but the Aowa soils are only fairly well suited because of restricted permeability.

Level, silty soils on flood plains

These soils make up about 1 percent of the county. About 95 percent of the acreage is range.

11. Salmo association

Poorly drained, level, silty soils on flood plains

This association is on the flood plain along Choteau Creek. The flood plain is 1/2 to 1 mile wide and is dissected by a meandering channel.

This association makes up about 1 percent of the county. It is about 65 percent Salmo soils and 35 percent minor soils.

The Salmo soils are on broad flats. Slopes dominantly are less than 1 percent. Typically, the surface layer is very dark gray silty clay loam. The subsurface layer is very dark gray and dark gray silty clay loam containing visible salts. The underlying material is dark gray and gray, calcareous silty clay loam and silty clay.

Minor in this association are the moderately well drained, loamy Bon soils on the higher parts of the flood plain and the moderately well drained Onita soils on slight rises.

About 95 percent of this association supports native grass and is used for grazing and hay. Measures that prevent overgrazing are the main management needs.

This association is well suited to range but is only fairly well suited to rangeland wildlife habitat. The major soils are poorly suited to cultivated crops and to tame pasture and hay and openland wildlife habitat because they have a seasonal high water table within a depth of 2.5 feet. They generally are unsuited to building site development and septic tank absorption fields because they are subject to flooding.

Nearly level to gently rolling, loamy soils on uplands and terraces

These soils dominantly are undulating and gently rolling but are nearly level on some terraces. They make up about 1 percent of the county. About 85 percent of the acreage is range.

12. Delmont-Enet-Talmo association

Well drained to excessively drained, nearly level to gently rolling, loamy soils on uplands and terraces

This association is on glacial outwash plains and terraces characterized by small depressions and a few

sloughs. Slopes generally are gently rolling but are nearly level in some areas. The drainage pattern is well defined along the larger drainageways but is poorly defined in areas where small drainageways terminate in the small depressions and sloughs.

This association makes up about 1 percent of the county. It is about 35 percent Delmont soils, 30 percent Enet soils, 20 percent Talmo soils, and 15 percent minor soils.

The somewhat excessively drained Delmont soils are on convex side slopes. Slopes range from 2 to 9 percent. Typically, the surface layer is very dark grayish brown loam. The subsoil is very dark grayish brown and dark brown loam and gravelly loam. It is calcareous in the lower part. The underlying material is multicolored, calcareous gravelly sand.

The well drained Enet soils are on slight rises and on smooth slopes. Slopes range from 0 to 9 percent. Typically, the surface layer is very dark grayish brown loam. The subsoil is dark grayish brown loam over grayish brown, calcareous sandy loam. The underlying material is multicolored, calcareous gravelly loamy sand and gravelly sand.

The excessively drained Talmo soils are on convex slopes. In this association they have a slope of 2 to 9 percent. Typically, the surface layer is dark grayish brown gravelly loam. The underlying material is multicolored, calcareous gravelly sand.

Minor in this association are the Arlo, Clarno, and Henkin soils. The very poorly drained and poorly drained Arlo soils are in slightly concave areas. The well drained Clarno and Henkin soils are not underlain by gravelly sand. They are in positions on the landscape similar to those of the Delmont and Enet soils.

About 85 percent of this association supports native grasses and is used for grazing. A few areas are cultivated. Corn, small grain, grain sorghum, and alfalfa are the main crops. Measures that prevent overgrazing are the main management needs. Controlling erosion, conserving moisture, and maintaining fertility are the main concerns if the major soils are cropped.

This association is fairly well suited to range and to rangeland wildlife habitat. The Delmont soils are fairly well suited to tame pasture and hay and poorly suited to cultivated crops. The Enet soils are well suited to tame pasture and hay and fairly well suited to cultivated crops. The Talmo soils generally are unsuited to cultivated crops and to tame pasture and hay. All three soils are well suited to most kinds of building site development. They are poorly suited to most sanitary facilities because the effluent can seep through the gravelly underlying material and pollute shallow ground water.

Undulating to very steep, loamy and clayey soils on uplands

These soils dominantly are strongly sloping to steep but are undulating and gently rolling at the upper ends of drainageways and are very steep on some of the breaks along the Missouri River. They make up about 20 percent of the county. About 93 percent of the acreage is range.

13. Ethan-Betts-Clarno association

Well drained, undulating to steep, loamy soils on uplands

This association dominantly is on the sides of large drainageways. Slopes generally are moderately sloping to steep but are undulating in some areas. The drainage pattern is well defined.

This association makes up about 8 percent of the county. It is about 30 percent Ethan soils, 30 percent Betts soils, 20 percent Clarno soils, and 20 percent minor soils.

The Ethan soils are on convex side slopes. In this association they have a slope of 9 to 25 percent. Typically, the surface layer is dark grayish brown loam. The subsoil is dark grayish brown and light gray, calcareous loam. The underlying material is light gray, calcareous clay loam.

The Betts soils are on convex slopes. In this association they have a slope of 15 to 40 percent. Typically, the surface layer is dark grayish brown, calcareous loam. The subsoil is brown, calcareous clay loam. The underlying material is pale yellow, calcareous clay loam.

The Clarno soils are on the lower side slopes. Slopes range from 2 to 15 percent. Typically, the surface layer is very dark grayish brown loam. The subsoil is dark grayish brown and light brownish gray loam. It is calcareous in the lower part. The underlying material is light brownish gray, calcareous loam.

Minor in this association are the moderately well drained Bon soils on flood plains; the silty Eakin soils, which occur as areas intermingled with areas of the Ethan and Clarno soils; and the Meadin and Talmo soils, which are underlain by gravelly sand and occur as areas intermingled with some areas of the Betts soils.

About 90 percent of this association is range. Controlling erosion and runoff is the main concern of management.

This association is well suited to range and rangeland wildlife habitat. It generally is unsuited to cultivated crops and to tame pasture and hay, building site development, and sanitary facilities because of the slope.

14. Sansarc association

Well drained, moderately sloping to very steep, clayey soils on uplands

This association is on breaks along the Missouri River. The landscape is characterized by steep slopes and deeply entrenched drainageways. The soils generally are very steep or steep but are moderately sloping on some side slopes. The drainage pattern is well defined.

This association makes up about 12 percent of the county. It is about 75 percent Sansarc soils and 25 percent minor soils.

The shallow Sansarc soils are on side slopes and ridges. Slopes range from 6 to 70 percent. Typically, the surface layer is dark grayish brown clay. The underlying material is dark grayish brown and grayish brown, calcareous clay and shaly clay. Below this is grayish brown shale.

Minor in this association are the calcareous, loamy Betts and calcareous, less dense Okaton soils on the higher ridges; the moderately deep Boyd soils in the less sloping areas; the moderately steep Gavins soils in the lower areas south of Fort Randall Dam; the silty Lowry soils on low tableland; the deep Promise soils on fans and foot slopes; and the silty Sully soils on the higher uplands.

About 95 percent of this association is range. Controlling erosion and runoff is the main concern of management.

This association is fairly well suited to range and to rangeland wildlife habitat. It generally is unsuited to cultivated crops and to tame pasture and hay, building site development, and sanitary facilities because of the slope. Because of the slope and the unstable nature of the shale, landslides are common.

detailed soil map units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and management of the soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and identifies the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Agar silt loam, 0 to 2 percent slopes, is one of several phases in the Agar series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more soils that occur as areas so intricately mixed or so small that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Eakin-Ethan complex, 2 to 6 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. These dissimiliar soils are described in each map unit. Also, some of the more unusual or strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes some *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, gravel, is an example. Some miscellaneous areas are large enough to be delineated on the soil maps. Some that are too small to be delineated are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

The names of some of the map units identified on the detailed soil maps do not fully agree with those identified on the maps in the soil surveys of adjacent Aurora, Douglas, and Hutchinson Counties. Differences are the result of variation in the design and composition of map units or changes in the application of the soil classification system.

soil descriptions

AaA—Agar silt loam, 0 to 2 percent slopes. This deep, well drained, nearly level soil is on uplands. Areas are 10 to 300 acres in size and are irregular in shape. Slopes are long and smooth.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsoil is dark grayish brown and pale brown, friable and firm silty clay loam about 25 inches thick. In the lower part it is calcareous and has soft accumulations of calcium carbonate. The underlying material to a depth of 60 inches is light brownish gray, calcareous silty clay loam and silt loam. It has soft accumulations of carbonate. In some areas clay loam glacial till is 20 to 40 inches from the surface.

Included with this soil in mapping are small areas of Lowry and Mobridge soils. These soils make up less than 10 percent of any one mapped area. Lowry soils contain less clay in the subsoil than the Agar soil. Also, they are higher on the landscape. The moderately well drained Mobridge soils are in swales.

Fertility is medium and organic matter content moderate in the Agar soil. Permeability also is moderate. Available water capacity is high. Runoff is slow.

Most of the acreage is cropland. This soil is well suited to cultivated crops and to tame pasture and hay. Alfalfa, intermediate wheatgrass, and smooth bromegrass are examples of suitable pasture plants. Measures that

conserve moisture are the main management needs in cultivated areas. Leaving crop residue on the surface is an example.

This soil is well suited to range. The native vegetation dominantly is western wheatgrass, green needlegrass, and big bluestem. Overused areas are dominated by western wheatgrass, blue grama, and Kentucky bluegrass. After continued overuse, Kentucky bluegrass and weeds dominate the site.

This soil is well suited to windbreaks and environmental plantings. Except for those species that can grow well only if the supply of moisture is high, all climatically suited trees and shrubs grow well.

This soil is well suited to most kinds of building site development and to septic tank absorption fields.

The capability unit is IIc-2; Silty range site.

AaB—Agar silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on uplands. Areas are 30 to 1,300 acres in size and are irregular in shape. Slopes are long and smooth.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsoil is dark grayish brown and pale brown, friable and firm silty clay loam about 25 inches thick. In the lower part it is calcareous and has soft accumulations of carbonate. The underlying material to a depth of 60 inches is light brownish gray, calcareous silty clay loam and silt loam. It has soft accumulations of carbonate. In some areas clay loam glacial till is 20 to 40 inches from the surface.

Included with this soil in mapping are small areas of Lowry and Mobridge soils. These soils make up less than 10 percent of any one mapped area. Lowry soils contain less clay in the subsoil than the Agar soil. Also, they are higher on the landscape. The moderately well drained Mobridge soils are in swales.

Fertility is medium and organic matter content moderate in the Agar soil. Permeability also is moderate. Available water capacity is high. Runoff is medium.

Most of the acreage is cropland. This soil is well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Measures that control erosion and conserve moisture are the main management needs in cultivated areas. Examples are tillage practices that leave crop residue on the surface. Contour farming, grassed waterways, and terraces also help to control erosion.

This soil is well suited to range. The native vegetation dominantly is western wheatgrass, green needlegrass, and big bluestem. Overused areas are dominated by western wheatgrass, blue grama, and Kentucky bluegrass. After continued overuse, Kentucky bluegrass and weeds dominate the site.

This soil is well suited to windbreaks and environmental plantings. Except for those species that can grow well only if the supply of moisture is high, all climatically suited trees and shrubs grow well.

This soil is well suited to most kinds of building site development and to septic tank absorption fields.

The capability unit is IIe-1; Silty range site.

AaC—Agar silt loam, 6 to 9 percent slopes. This deep, well drained, moderately sloping soil is on uplands. Areas are 20 to 200 acres in size and are irregular in shape. Most of the slopes are long and smooth.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsoil is dark grayish brown and pale brown, friable and firm silty clay loam about 20 inches thick. In the lower part it is calcareous and has soft accumulations of carbonate. The underlying material to a depth of 60 inches is light brownish gray, calcareous silty clay loam and silt loam. It has soft accumulations of carbonate. In some areas clay loam glacial till is 20 to 40 inches from the surface.

Included with this soil in mapping are small areas of Lowry, Mobridge, and Sully soils. These soils make up less than 15 percent of any one mapped area. Lowry soils contain less clay in the subsoil than the Agar soil. Also, they are higher on the landscape. The moderately well drained Mobridge soils are in swales. Sully soils are steeper than the Agar soil. Also, their surface layer is not so dark and their subsoil contains less clay.

Fertility is medium and organic matter content moderate in the Agar soil. Permeability also is moderate. Available water capacity is high. Runoff is medium.

Most of the acreage is cropland. This soil is fairly well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Measures that control erosion and conserve moisture are the main management needs in cultivated areas. Examples are tillage practices that leave crop residue on the surface. Contour farming, grassed waterways, and terraces also help to control erosion.

This soil is well suited to range. The native vegetation dominantly is western wheatgrass, green needlegrass, and big bluestem. Overused areas are dominated by western wheatgrass, blue grama, and Kentucky bluegrass. After continued overuse, Kentucky bluegrass and weeds dominate the site.

This soil is well suited to windbreaks and environmental plantings. Except for those species that can grow well only if the supply of moisture is high, all climatically suited trees and shrubs grow well. Planting on the contour helps to control erosion.

This soil is well suited to most kinds of building site development and to septic tank absorption fields. Small commercial buildings should be designed to conform to the natural slope of the land. Land shaping is needed in some areas.

The capability unit is IIIe-1; Silty range site.

Ab—Albaton silty clay. This deep, poorly drained, level soil is on the flood plain along the Missouri River. Occasional flooding is a hazard, but it occurs as local

Figure 3.—A cropped area of Albaton silty clay.

runoff Fort Randall Dam holds back the potential floodwater in the river. Areas are 10 to 425 acres in size and are long and narrow or irregularly shaped.

Typically, the surface layer is grayish brown, calcareous silty clay about 9 inches thick. The underlying material to a depth of 60 inches is light brownish gray, calcareous, stratified silty clay, clay, silty clay loam, and silt. It has common, fine, faint, gray and light yellowish brown mottles. In places it is stratified silt loam, loam, very fine sand, and fine sand.

Included with this soil in mapping are small areas of Aowa, Haynie, and Haynie Variant soils on the higher parts of the flood plain. These soils make up less than 15 percent of any one mapped area. Aowa soils are moderately well drained, and Haynie and Haynie Variant soils are well drained.

Fertility is medium and organic matter content moderate in the Albaton soil. Tilth is poor. Permeability is slow. Available water capacity is moderate. A seasonal high water table is at a depth of 1 to 3 feet. Runoff is slow. The shrink-swell potential is high.

Most of the acreage is cropland (fig. 3). This soil is fairly well suited to cultivated crops and to tame pasture and hay. Alfalfa, intermediate wheatgrass, and smooth bromegrass are suitable pasture plants. Deferring grazing when the soil is wet helps to prevent puddling. In most years fieldwork is delayed because of local runoff. Controlling local runoff and wind erosion and improving tilth are the main concerns of management. Improving natural drainage channels helps to remove excess floodwater. Including grasses and legumes in the cropping system improves tilth and helps to control wind erosion.

This soil is well suited to native grasses, but very few areas are used as range. The native vegetation dominantly is big bluestem. Overused areas are dominated by western wheatgrass, inland saltgrass, and Kentucky bluegrass.

This soil is well suited to windbreaks and environmental plantings. The trees and shrubs that require an abundant moisture supply grow especially well.

This soil generally is unsuited to building site development and septic tank absorption fields because of the wetness and the flooding.

The capability unit is IIIw-3; Subirrigated range site.

An—Albaton silty clay, depressional. This deep, very poorly drained soil is in old oxbows on the flood plain along the Missouri River. Frequent flooding is a hazard, but it occurs as local runoff. Fort Randall Dam holds back the potential floodwater in the river. Areas are 15 to 115 acres in size and are long and narrow.

Typically, the surface layer is grayish brown, calcareous silty clay about 7 inches thick. The underlying material to a depth of 60 inches is dark grayish brown, dark gray, and olive, calcareous, stratified silty clay loam, silty clay, and clay. It has common, medium, faint, yellowish brown mottles. In places the soil is not so wet.

Included with this soil in mapping are small areas of the well drained Haynie Variant soils on the slightly higher parts of the flood plain. These soils make up less than 5 percent of any one mapped area.

Fertility is medium and organic matter content moderate in the Albaton soil. Permeability is slow. Available water capacity is moderate. A seasonal high water table is within a depth of 2 feet. As much as 0.5 foot of water ponds on the surface during some wet periods. Runoff is slow to ponded. The shrink-swell potential is high.

Most areas support native vegetation and are used as habitat for wildlife. The native vegetation dominantly is cottonwood, green ash, and willows and an understory of brush and prairie cordgrass. In overused areas the understory is dominated by rushes and western wheatgrass.

The soil is fairly well suited to tame pasture and hay. Water tolerant species, such as Garrison creeping foxtail and reed canarygrass, are suitable.

This soil generally is unsuited to cultivated crops, windbreaks and environmental plantings, building site development, and septic tank absorption fields because of the wetness and the flooding.

The capability unit is Vw-4; Wetland range site.

Ao—Aowa silty clay loam. This deep, moderately well drained, nearly level soil is on the flood plain along the Missouri River. Fort Randall Dam holds back the potential floodwater in the river. Areas are 20 to 270 acres in size and are oblong or irregularly shaped.

Typically, the surface layer is grayish brown silty clay loam about 8 inches thick. The subsurface layer is about 11 inches of grayish brown, friable, stratified silty clay loam and silt loam. The underlying material to a depth of 60 inches is pale brown, brown, and light brownish gray, stratified, calcareous silt loam and silty clay loam. In places the soil contains more sand and less silt.

Included with this soil in mapping are small areas of Albaton, Haynie Variant, and Wendte Variant soils. These soils make up less than 10 percent of any one mapped area. The poorly drained Albaton soils are lower on the flood plain than the Aowa soil. Also, they contain more clay throughout. The well drained Haynie Variant soils are slightly higher on the flood plain than the Aowa soil. Also, they have a lighter colored surface layer. Wendte Variant soils contain more clay throughout than the Aowa soil. They are in positions on the flood plain similar to those of the Aowa soil.

Fertility is medium and organic matter content moderate in the Aowa soil. Permeability also is moderate. Available water capacity is high. Runoff is slow.

Most of the acreage is cropland. This soil is well suited

to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Farming is delayed in some years because of wetness. The main management needs, however, are measures that conserve moisture. Examples are tillage practices that leave crop residue on the surface.

This soil is well suited to range. The native vegetation dominantly is big bluestem. Overused areas are dominated by western wheatgrass and Kentucky bluegrass. After continued overuse, Kentucky bluegrass and weeds dominate the site.

This soil is well suited to windbreaks and environmental plantings. The trees and shrubs that require an abundant moisture supply grow especially well.

This soil is well suited to most kinds of building site development. It is only fairly well suited to septic tank absorption fields because of restricted permeability. Enlarging the absorption area, however, helps to overcome the slow absorption of liquid waste.

The capability unit is IIc-1; Overflow range site.

Ar—Arlo silt loam, wet. This deep, very poorly drained, nearly level soil is in depressions in the uplands. It is ponded during periods of snowmelt and heavy rainfall. Areas are 5 to 140 acres in size and are long and narrow or irregularly shaped.

Typically, the surface layer is gray, calcareous silt loam about 7 inches thick. The next 13 inches is gray, calcareous clay loam. The upper part of the underlying material is gray, calcareous silty clay loam. The lower part to a depth of 60 inches is light brownish gray and light yellowish brown, calcareous gravelly loam.

Included with this soil in mapping are small areas of Enet and Worthing soils. These soils make up less than 5 percent of any one mapped area. The well drained Enet soils are on the higher parts of the landscape. Worthing soils are in depressions. They are leached of free carbonates to a depth of 40 inches or more.

Fertility is medium and organic matter content moderate in the Arlo soil. Permeability is moderate in the upper part of the soil and rapid in the gravelly underlying material. Available water capacity is high. A seasonal high water table is within a depth of 2 feet. As much as 1 foot of water ponds on the surface during some wet periods. Runoff is very slow or ponded. The shrink-swell potential is moderate.

All of the acreage supports native grasses. This soil is fairly well suited to range. The natural vegetation dominantly is prairie cordgrass and sedges. Overused areas are dominated by western wheatgrass and Kentucky bluegrass. In many areas the surface is rough and compacted because of trampling by livestock.

This soil is fairly well suited to tame pasture and hay. Water tolerant species, such as Garrison creeping foxtail and reed canarygrass, grow well.

This soil generally is unsuited to windbreaks and environmental plantings, cultivated crops, building site development, and septic tank absorption fields because of the ponding.

The capability unit is Vw-3; Wetland range site.

AsA—Arlo-Enet loams, 0 to 2 percent slopes. These nearly level soils are on terraces. They are moderately deep to sand and gravel. The poorly drained Arlo soil is adjacent to depressions and flood plains. It is occasionally flooded. The well drained Enet soil is on the slightly higher parts of the landscape. Slopes generally are smooth. Areas are 50 to 100 acres in size and are irregular in shape. They are about 40 to 50 percent Arlo soil and 30 to 40 percent Enet soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Arlo soil is dark gray, calcareous loam about 9 inches thick. The next 7 inches is dark gray, calcareous clay loam. The upper 23 inches of the underlying material is gray, calcareous clay loam and sandy clay loam. The lower part to a depth of 60 inches is light gray, calcareous gravelly loamy sand.

Typically, the surface layer of the Enet soil is very dark grayish brown loam about 7 inches thick. The subsoil is about 23 inches thick. The upper part is dark grayish brown, friable loam. The lower part is grayish brown, friable, calcareous sandy loam. It has soft accumulations of carbonate. The underlying material to a depth of 60 inches is very pale brown gravelly loamy sand over multicolored gravelly sand. It is calcareous.

Included with these soils in mapping are small areas of Prosper, Salmo, and Tetonka soils. These included soils make up less than 20 percent of any one mapped area. The moderately well drained Prosper soils are in swales. The poorly drained Salmo and Tetonka soils are not underlain by gravelly material. Salmo soils are on the flood plain along narrow drainageways, and Tetonka soils are in depressions.

Fertility is medium and organic matter content moderate in the Arlo and Enet soils. Permeability is moderate in the upper part of both soils and rapid in the underlying gravelly material. Available water capacity is low. The Arlo soil has a seasonal high water table within a depth of 2 feet. Runoff is slow on both soils. The shrink-swell potential is moderate in the upper part of the Arlo soil and low throughout the Enet soil.

Most of the acreage supports native grasses. These soils are well suited to range. The native vegetation on the Arlo soil dominantly is big bluestem. That on the Enet soil dominantly is green needlegrass and western wheatgrass. Overused areas are dominated by western wheatgrass, needleandthread, and Kentucky bluegrass. After continued overuse, Kentucky bluegrass, saltgrass, and weeds dominate the site.

These soils are fairly well suited to cultivated crops and to tame pasture and hay. Examples of suitable

pasture plants are alfalfa, crested wheatgrass, intermediate wheatgrass, and smooth bromegrass. The seasonal high water table in the Arlo soil delays planting in the spring. The availability of plant nutrients is adversely affected by the high content of lime in the Arlo soil. Because it has porous underlying material, the Enet soil is somewhat droughty and has a limited root zone. The main management concerns if these soils are cultivated are wind erosion on both soils, the wetness and low fertility in the Arlo soil, and the droughtiness of the Enet soil. Leaving crop residue on the surface improves fertility, conserves moisture, and helps to control wind erosion.

The Arlo soil is well suited and the Enet soil poorly suited to windbreaks and environmental plantings. Because of droughtiness, no trees and shrubs grow well on the Enet soil. Windbreaks can be established, but optimum growth is unlikely.

Because of the wetness in the Arlo soil, the Enet soil is a better site for buildings. The sides of shallow excavations tend to cave in, however, unless they are shored. The Arlo soil generally is unsuited to septic tank absorption fields because of the wetness. The Enet soil readily absorbs but does not adequately filter the effluent in these absorption fields. The poor filtering capacity may result in the pollution of shallow ground water.

The Enet soil is a probable source of sand and gravel for use as road construction material.

The Arlo soil is in capability unit IIIw-3, Subirrigated range site; the Enet soil is in capability unit IIIs-2, Silty range site.

BbC—Beadle-Eakin complex, 6 to 9 percent slopes. These deep, well drained, gently rolling soils are on uplands. The Beadle soil is on the upper convex sides and tops of knolls. The Eakin soil is on the lower side slopes. Scattered stones are on the surface in places. Areas are 10 to more than 200 acres in size and are irregular in shape. They are 45 to 55 percent Beadle soil and 30 to 40 percent Eakin soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Beadle soil is dark grayish brown loam about 6 inches thick. The subsoil is dark grayish brown and grayish brown, firm clay loam about 24 inches thick. In the lower part it is calcareous and has soft accumulations of carbonate. The underlying material to a depth of 60 inches is light brownish gray, calcareous clay loam. It has soft accumulations of carbonate in the upper part. In places free carbonates are within a depth of 12 inches.

Typically, the surface layer of the Eakin soil is dark grayish brown silt loam about 7 inches thick. The subsoil is grayish brown and light olive brown, friable silty clay loam about 22 inches thick. In the lower part it is calcareous and has soft accumulations of carbonate that extend into the underlying material. The underlying material to a depth of 60 inches is pale olive, calcareous clay loam.

Included with these soils in mapping are small areas of DeGrey, Hoven, Jerauld, and Onita soils. These included soils make up less than 15 percent of any one mapped area. DeGrey and Jerauld soils have a sodium affected subsoil. They are in slight depressions. The poorly drained Hoven soils are in depressions. The moderately well drained Onita soils are in swales.

Fertility is medium and organic matter content moderate in the Beadle and Eakin soils. Tilth is fair in the Beadle soil. Permeability is moderately slow in the Beadle soil. It is moderate in the subsoil of the Eakin soil and moderately slow in the underlying material. Available water capacity is high in both soils. Runoff is medium. The shrink-swell potential is high in the Beadle soil and moderate in the Eakin soil.

Most of the acreage supports native grasses. These soils are well suited to range. The native vegetation dominantly is bluestems, green needlegrass, and western wheatgrass. Overused areas are dominated by western wheatgrass, blue grama, and weeds.

This map unit is poorly suited to cultivated crops. It is fairly well suited to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Controlling erosion and improving tilth are the main concerns of management. Minimizing tillage and leaving crop residue on the surface help to control erosion, conserve moisture, and improve tilth. Contour farming, grassed waterways, and terraces also help to control erosion, but the slopes in some areas are too short or too irregular for contouring and terracing.

This map unit is fairly well suited to windbreaks and environmental plantings. Except for those species that require an abundant moisture supply, most of the climatically suited trees and shrubs grow well. Planting on the contour helps to control erosion.

Because of the slope and the high shrink-swell potential, the Beadle soil is poorly suited to most kinds of building site development. The Eakin soil is only fairly well suited because of the moderate shrink-swell potential and the slope. Buildings should be designed to conform to the natural slope of the land. Land shaping is needed in some areas. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage.

Because of the restricted permeability, the Beadle soil is poorly suited and the Eakin soil only fairly well suited to septic tank absorption fields. Enlarging the absorption area helps to overcome the slow absorption of liquid waste. Land shaping and installation of the distribution lines across the slope generally improve the efficiency of the absorption field.

The Beadle soil is in capability unit IVe-7, Clayey range

site; the Eakin soil is in capability unit IIIe-2, Silty range site.

BcA—Beadle-Jerauld complex, 0 to 4 percent slopes. These deep, nearly level and gently sloping soils are in areas on uplands where slopes are long and smooth. The well drained Beadle soil is on convex slopes. In places a few scattered stones and small glacial boulders are on the surface. The moderately well drained Jerauld soil is on side slopes and in swales. Areas are 15 to 500 acres in size and are irregular in shape. They are 50 to 60 percent Beadle soil and 25 to 35 percent Jerauld soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Beadle soil is dark grayish brown loam about 6 inches thick. The subsoil is dark grayish brown and grayish brown, firm clay loam about 24 inches thick. In the lower part it is calcareous and has soft accumulations of carbonate. The underlying material to a depth of 60 inches is light brownish gray, calcareous clay loam. It has soft accumulations of carbonate in the upper part. In places free carbonates are within a depth of 12 inches.

Typically, the surface layer of the Jerauld soil is grayish brown silt loam about 3 inches thick. The subsoil is dark grayish brown and brown, very firm clay about 15 inches thick. In the lower part it is calcareous and has visible salt crystals. The underlying material to a depth of 60 inches is multicolored, calcareous clay loam. It has soft accumulations of carbonate in the upper part. In places the surface layer is thicker.

Included with these soils in mapping are small areas of Eakin, Hoven, and Onita soils. These included soils make up less than 20 percent of any one mapped area. The silty Eakin soils are on side slopes. The poorly drained Hoven soils are in depressions. The moderately well drained Onita soils are in swales. They do not have a sodium affected subsoil.

Fertility is medium in the Beadle soil and low in the Jerauld soil. Organic matter content is moderate in the Beadle soil and low in the Jerauld soil. Tilth is fair in the Beadle soil and poor in the Jerauld soil. Permeability is moderately slow in the Beadle soil and slow in the Jerauld soil. Available water capacity is high in the Beadle soil and low or moderate in the Jerauld soil. Runoff is medium on the Beadle soil and slow on the Jerauld soil. The shrink-swell potential is high in both soils.

About half of the acreage is cropland. The Beadle soil is fairly well suited and the Jerauld soil generally unsuited to cultivated crops and to tame pasture and hay. Alfalfa, intermediate wheatgrass, and smooth bromegrass grow well on the Beadle soil, but no pasture plants grow well on the Jerauld soil. Because the Jerauld soil occurs in a random pattern throughout the map unit, it is cropped along with the Beadle soil. Controlling erosion and improving tilth are the main concerns in managing cultivated areas. The dense claypan subsoil near the surface and the salts in the subsoil severely restrict the root zone and the rate of water intake in the Jerauld soil. Tilling when the soil is wet causes compaction of the subsoil. Minimizing tillage, applying manure, and leaving crop residue on the surface help to control erosion, conserve moisture, and improve tilth.

This map unit is only fairly well suited to range. Grass production is limited by the shallow, compact, salty subsoil in the Jerauld soil. The native vegetation on the Beadle soil dominantly is western wheatgrass and green needlegrass. That on the Jerauld soil is a sparse stand of western wheatgrass and blue grama. Overused areas of the Beadle soil are dominated by blue grama and buffalograss. Overused areas of the Jerauld soil are bare or are dominated by weeds.

The Beadle soil is fairly well suited and the Jerauld soil generally unsuited to windbreaks and environmental plantings. No trees or shrubs grow well on the Jerauld soil.

These soils are poorly suited to most kinds of building site development because of the high shrink-swell potential. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings, however, help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage.

Because of the restricted permeability, these soils are poorly suited to septic tank absorption fields. These fields generally do not function well unless they are greatly expanded. Sewage lagoons can be used as an alternative sewage disposal system.

The Beadle soil is in capability unit IIIe-3, Clayey range site; the Jerauld soil is in capability unit VIs-1, Thin Claypan range site.

BdF—Betts loam, 25 to 40 percent slopes. This deep, well drained, steep soil is on the sides of drainageways and the upper parts of the breaks along the Missouri River. In places stones and glacial boulders are on the surface. Areas are 20 to 1,300 acres in size and are long and narrow or irregularly shaped. Slopes are short and steep.

Typically, the surface layer is dark grayish brown, calcareous loam about 3 inches thick. The subsoil is brown, friable, calcareous clay loam about 6 inches thick. The underlying material to a depth of 60 inches is pale yellow, calcareous clay loam that has accumulations of carbonate. The content of pebbles and stones is 5 to 15 percent throughout the soil. In places the surface layer is more than 5 inches thick.

Included with this soil in mapping are small areas of Bon, Sansarc, Sully, and Talmo soils. These soils make up less than 15 percent of any one mapped area. The moderately well drained Bon soils are on narrow flood plains. Sansarc soils are clayey and are 10 to 20 inches deep over shale. They are lower on the landscape than

the Betts soil. The silty Sully soils formed in loess. They are on the less sloping ridgetops. Talmo soils are less than 14 inches deep over gravelly sand. They are on the more convex ridges and knobs.

Fertility and organic matter content are low in the Betts soil. Permeability is moderate in the subsoil and moderately slow in the underlying material. Available water capacity is high. Runoff is rapid. The shrink-swell potential is moderate.

Most of the acreage is range. The native vegetation dominantly is little bluestem, sideoats grama, and needleandthread. Overused areas are dominated by needleandthread and blue grama. Many areas in the deeper draws are suitable sites for stock water impoundments.

This soil generally is too steep for cultivated crops, tame pasture and hay, windbreaks and environmental plantings, building site development, and septic tank absorption fields. Some of the wooded draws provide habitat for wildlife, such as deer, rabbits, ring-necked pheasant, grouse, and quail (fig. 4).

The capability unit is VIIe-3; Thin Upland range site.

BeE—Betts-Ethan loams, 9 to 25 percent slopes. These deep, well drained, strongly sloping and moderately steep soils are on the upper part of the breaks along the Missouri River and on the sides of

Figure 4.—An area of Betts loam, 25 to 40 percent slopes. The wooded draws provide excellent protection for wildlife.

other major drainageways. In places stones and boulders are on the surface. The Betts soil is on convex knolls and ridges. The Ethan soil is on the less sloping side slopes. Areas are 20 to 400 acres in size and are irregular in shape. They are about 40 to 50 percent Betts soil and 30 to 40 percent Ethan soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Betts soil is dark grayish brown, calcareous loam about 3 inches thick. The subsoil is brown, friable, calcareous clay loam about 6 inches thick. The underlying material to a depth of 60 inches is pale yellow, calcareous clay loam.

Typically, the surface layer of the Ethan soil is dark grayish brown loam about 6 inches thick. The subsoil is dark grayish brown and light gray, friable loam about 15 inches thick. The underlying material to a depth of 60 inches is light gray, calcareous clay loam.

Included with these soils in mapping are small areas of Bon, Boyd, Prosper, and Talmo soils. These included soils make up less than 20 percent of any one mapped area. The moderately well drained Bon soils are along narrow drainageways. The clayey Boyd soils are 20 to 40 inches deep over shale. They are on the lower slopes adjacent to the breaks along the Missouri River. The moderately well drained Prosper soils are in swales. Talmo soils have gravelly sand within a depth of 14 inches. They are on ridges and knolls.

Fertility and organic matter content are low in the Betts and Ethan soils. Permeability is moderate in the subsoil and moderately slow in the underlying material. Available water capacity is high. Runoff is rapid. The shrink-swell potential is moderate.

Most of the acreage supports native grasses (fig. 5). These soils are fairly well suited to range. The native vegetation dominantly is little bluestem, sideoats grama, needlegrass, and western wheatgrass. Overused areas are dominated by needleandthread, western wheatgrass, sideoats grama, blue grama, and annual grasses and weeds.

These soils generally are too steep for cultivated crops, tame pasture and hay, windbreaks and environmental plantings, building site development, and septic tank absorption fields. Climatically suited trees

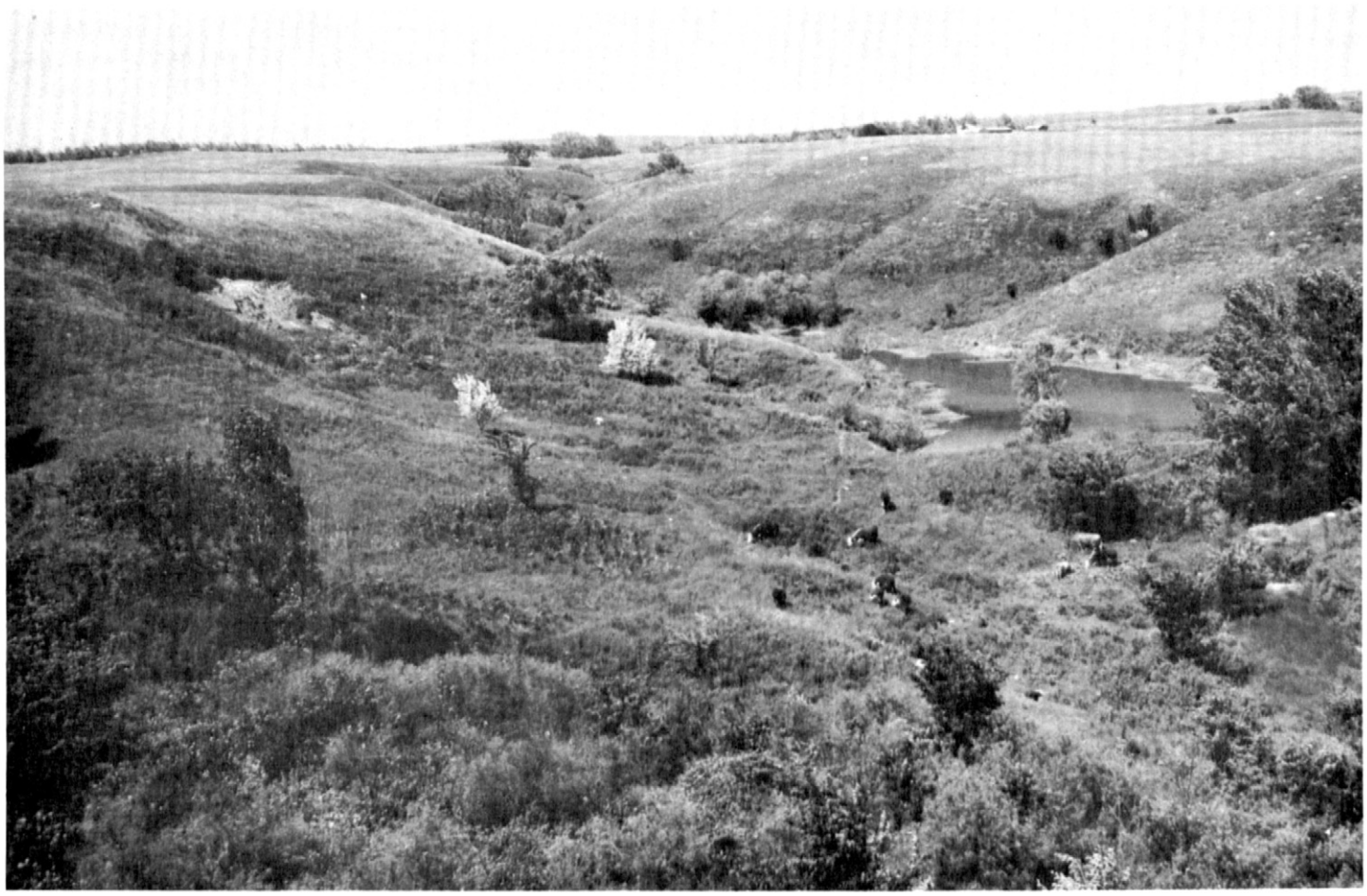

Figure 5.—An area of Betts-Ethan loams, 9 to 25 percent slopes, used as range.

and shrubs can be established for special purposes if they are planted by hand and given special care.

The capability unit is VIe-3; the Betts soil is in Thin Upland range site, the Ethan soil in Silty range site.

Bn—Bon silt loam. This deep, moderately well drained, nearly level soil is on flood plains and low stream terraces. It is occasionally flooded. Areas are 10 to 150 acres in size and are irregular in shape. Slopes are 0 to 2 percent and are long and smooth.

Typically, the surface layer is dark grayish brown silt loam about 4 inches thick. The subsurface layer is dark gray silt loam about 18 inches thick. The underlying material to a depth of 60 inches is light brownish gray, pale brown, and gray, calcareous, stratified loam and fine sandy loam.

Included with this soil in mapping are small areas of Onita and Salmo soils. These soils make up less than 15 percent of any one mapped area. Onita soils contain more clay in the subsoil than the Bon soil. They are in swales. The poorly drained Salmo soils are on the low parts of the flood plains.

Fertility and organic matter content are high in the Bon soil. Permeability is moderate. Available water capacity is high. Runoff is slow.

Most of the acreage is cropland. This soil is well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, Garrison creeping foxtail, intermediate wheatgrass, and smooth bromegrass. The main concern of management is conserving moisture during dry periods. Floodwater delays planting in some years, but in most years the additional moisture is beneficial and the flood damage is minor. Leaving crop residue on the surface and including grasses and legumes in the cropping system conserve moisture.

This soil is well suited to range. The native vegetation dominantly is big bluestem and green needlegrass. Overused areas are dominated by western wheatgrass and Kentucky bluegrass. After continued overuse, Kentucky bluegrass and weeds dominate the site.

This soil is well suited to windbreaks and environmental plantings. The trees and shrubs that require an abundant supply of moisture grow especially well.

Because of the flooding, this soil generally is unsuitable as a site for buildings and sanitary facilities.

The capability unit is IIc-3; Overflow range site.

Bo—Bon silt loam, channeled. This deep, moderately well drained, nearly level soil is on flood plains that are dissected into many small tracts by narrow channels and partly filled old stream meanders. It is frequently flooded. Areas are 10 to more than 400 acres in size and are long and narrow.

Typically, the surface layer is dark grayish brown silt loam about 4 inches thick. The subsurface layer is dark gray silt loam about 18 inches thick. The underlying material to a depth of 60 inches is light brownish gray, pale brown, and gray, calcareous, stratified loam and fine sandy loam. In places it contains more clay.

Included with this soil in mapping are small areas of Prosper and Salmo soils. These soils make up less than 15 percent of any one mapped area. Prosper soils are not stratified. They are near the uplands. The poorly drained Salmo soils are on the low parts of the flood plains.

Organic matter content and fertility are high in the Bon soil. Permeability is moderate. Available water capacity is high. A seasonal high water table is at a depth of 2 to 6 feet in the spring of most years. Runoff is slow.

Most of the acreage supports native grasses. This soil is well suited to range. The native vegetation dominantly is big bluestem, switchgrass, and deciduous trees. The trees provide protection for wildlife and livestock. Overused areas are dominated by western wheatgrass and Kentucky bluegrass.

This soil generally is unsuited to cultivated crops and to tame pasture and hay because of the small size of each tract and the flooding in spring. It is suited to windbreaks and environmental plantings. All climatically suited trees and shrubs grow well. They can be planted by hand. Because of the meandering stream channels, however, they generally cannot be planted by machine.

This soil generally is unsuitable as a site for buildings and sanitary facilities because of the flooding.

The capability unit is VIw-1; Subirrigated range site.

BsD—Boyd-Sansarc complex, 6 to 15 percent slopes. These well drained, moderately sloping and strongly sloping soils are on uplands. The moderately deep Boyd soil is on the less sloping side slopes and foot slopes. The shallow Sansarc soil is on the steeper side slopes and convex ridges. Areas are 20 to 200 acres in size and are irregular in shape. They are 50 to 60 percent Boyd soil and 30 to 40 percent Sansarc soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Boyd soil is dark gray silty clay about 5 inches thick. The subsoil is dark grayish brown and dark gray, very firm and extremely firm, calcareous clay about 18 inches thick. The underlying material, to a depth of about 31 inches, is dark gray and grayish brown, calcareous clay and shaly clay. It contains crystals of gypsum. Below the shaly clay to a depth of 60 inches is gray shale that has accumulations of carbonate in the cracks and seams. In places the depth to shale is more than 40 inches.

Typically, the surface layer of the Sansarc soil is dark grayish brown clay about 4 inches thick. The next 9 inches is dark grayish brown and grayish brown, calcareous clay and shaly clay. Below this to a depth of 60 inches is grayish brown shale that has soft

accumulations of carbonate in the seams and cracks. In places the soil is not so firm and contains less clay.

Included with these soils in mapping are small areas of Betts, Gavins, and Sully soils. These included soils make up less than 10 percent of any one mapped area. The loamy Betts soils formed in glacial till. They are on the higher parts of the landscape. Gavins soils are 10 to 20 inches deep over siltstone. They are lower on the landscape than the Boyd and Sansarc soils. The silty Sully soils formed in loess. They are higher on the landscape than the Boyd and Sansarc soils.

Fertility is medium in the Boyd soil and low in the Sansarc soil. Organic matter content is moderate in the Boyd soil and low in the Sansarc soil. Tilth is poor in both soils. Permeability is slow. Available water capacity is low in the Boyd soil and very low in the Sansarc soil. Runoff is rapid on both soils. The shrink-swell potential is very high.

Most areas support native grasses. The Boyd soil is well suited and the Sansarc soil fairly well suited to range. The native vegetation on the Boyd soil dominantly is western wheatgrass and green needlegrass. That on the Sansarc soil dominantly is little bluestem and western wheatgrass. Overused areas are dominated by western wheatgrass, sideoats grama, and blue grama.

The Boyd soil is poorly suited and the Sansarc soil generally unsuited to cultivated crops and to tame pasture and hay. Alfalfa, intermediate wheatgrass, and smooth bromegrass are suitable. Small grain is better suited than row crops. If cultivated crops are grown, the main management needs are measures that control erosion and improve tilth. Including grasses and legumes in the cropping system and leaving crop residue on the surface conserve moisture, help to control erosion, and improve tilth.

The Boyd soil is better suited than the Sansarc soil to windbreaks and environmental plantings. It is only fairly well suited, however, because it is clayey and moderately deep over shale. Planting on the contour helps to control erosion and conserves moisture. Trees and shrubs grow fairly well on the Boyd soil, but optimum growth and survival are unlikely on the Sansarc soil.

Because of the slope, the limited depth to bedrock, and the very high shrink-swell potential, the Boyd soil is poorly suited and the Sansarc soil generally unsuited to building site development. The limitations of the Sansarc soil generally are so severe that they cannot be overcome. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings, however, helps to prevent the structural damage caused by the shrinking and swelling of the Boyd soil. Reinforcing foundations and footings also helps to prevent this damage. The buildings constructed on this soil should be designed to conform to the natural slope of the land. Land shaping is needed in some areas.

Because of the very restricted permeability and the limited depth to bedrock, these soils generally are unsuitable as septic tank absorption fields.

The Boyd soil is in capability unit IVe-4, Clayey range site; the Sansarc soil is in capability unit VIe-12, Shallow Clay range site.

CeB—Clarno-Ethan loams, 2 to 6 percent slopes. These deep, well drained, undulating soils are on uplands. The Clarno soil is on side slopes and the Ethan soil on mounds and ridges. In places scattered stones are on the surface. Areas are 40 to 150 acres in size and are irregular in shape. They are 50 to 60 percent Clarno soil and 25 to 35 percent Ethan soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Clarno soil is very dark grayish brown loam about 7 inches thick. The subsoil is dark grayish brown and light brownish gray, friable loam about 17 inches thick. It is calcareous in the lower part. The underlying material to a depth of 60 inches is light brownish gray, calcareous loam. It has soft accumulations of carbonate in the upper part. In places the subsoil contains more clay.

Typically, the surface layer of the Ethan soil is dark grayish brown, calcareous loam about 6 inches thick. The subsoil is dark grayish brown and light gray, friable, calcareous loam about 15 inches thick. The underlying material to a depth of 60 inches is light gray, calcareous clay loam. In places the surface layer is not so dark.

Included with these soils in mapping are small areas of Prosper and Tetonka soils. These soils make up less than 20 percent of any one mapped area. The moderately well drained Prosper soils are in swales. The poorly drained Tetonka soils are in depressions.

Fertility is medium in the Clarno soil and low in the Ethan soil. Organic matter content is moderate in the Clarno soil and low in the Ethan soil. Permeability is moderate in the subsoil of both soils and moderately slow in the underlying material. Available water capacity is high. Runoff is medium. The shrink-swell potential is moderate.

Most of the acreage is cropland. The Clarno soil is well suited and the Ethan soil fairly well suited to cultivated crops and to tame pasture and hay. The high content of lime in the Ethan soil adversely affects the availability of plant nutrients. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. The main concerns of management are controlling erosion and conserving moisture. Increasing the organic matter content and improving fertility also are concerns in areas of the Ethan soil. Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to control erosion, conserve moisture, increase the organic matter content, and improve fertility. Contour farming, grassed waterways, and terraces also can help to control erosion, but the slopes in some

areas are too short or too irregular for contouring and terracing.

These soils are well suited to range. The native vegetation dominantly is western wheatgrass and green needlegrass. Overused areas are dominated by western wheatgrass and needleandthread. After continued overuse, blue grama, Kentucky bluegrass, and weeds dominate the site.

The Clarno soil is well suited and the Ethan soil poorly suited to windbreaks and environmental plantings. Except for those that require an abundant supply of moisture, all climatically suited trees and shrubs grow well on the Clarno soil. No trees and shrubs grow well on the Ethan soil; optimum survival and growth are unlikely.

These soils are only fairly well suited to building site development because of the moderate shrink-swell potential. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings, however, help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage.

These soils are only fairly well suited to septic tank absorption fields because of the restricted permeability. Enlarging the absorption area, however, helps to overcome the slow absorption of liquid waste.

The Clarno soil is in capability unit IIe-2, the Ethan soil in capability unit IIIe-12; both soils are in Silty range site.

CeC—Clarno-Ethan loams, 6 to 9 percent slopes. These deep, well drained, gently rolling soils are on uplands. The Clarno soil is on side slopes. The Ethan soil is on the upper slopes and ridges. Scattered stones and pebbles are on the surface in places. Areas are 35 to 200 acres in size and are irregular in shape. They are 50 to 60 percent Clarno soil and 25 to 35 percent Ethan soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Clarno soil is very dark grayish brown loam about 7 inches thick. The subsoil is dark grayish brown and light brownish gray, friable loam about 17 inches thick. It is calcareous in the lower part. The underlying material to a depth of 60 inches is light brownish gray, calcareous loam. It has soft accumulations of carbonate in the upper part. In places the subsoil contains more clay.

Typically, the surface layer of the Ethan soil is dark grayish brown, calcareous loam about 6 inches thick. The subsoil is dark grayish brown and light gray, friable, calcareous loam about 15 inches thick. The underlying material to a depth of 60 inches is light gray, calcareous clay loam. In places the surface layer is not so dark.

Included with these soils in mapping are small areas of Prosper and Tetonka soils. These included soils make up 15 to 20 percent of any one mapped area. The moderately well drained Prosper soils are in swales. The poorly drained Tetonka soils are in depressions.

Fertility is medium in the Clarno soil and low in the Ethan soil. Organic matter content is moderate in the Clarno soil and low in the Ethan soil. Permeability is moderate in the subsoil of both soils and moderately slow in the underlying material. Available water capacity is high. Runoff is medium. The shrink-swell potential is moderate.

Most of the acreage is cropland. These soils are fairly well suited to cultivated crops. Controlling erosion and conserving moisture are the main concerns of management. Improving the fertility of the Ethan soil also is a concern. The high content of lime in the surface layer of this soil adversely affects the availability of plant nutrients. Minimizing tillage and leaving crop residue on the surface help to control erosion, conserve moisture, and improve fertility and tilth. Contour farming, grassed waterways, and terraces also can help to control erosion, but the slopes in some areas are too short or too irregular for contouring and terracing.

A cover of tame pasture plants or hay is effective in controlling erosion. These soils are well suited to tame pasture and hay, but forage production is limited by the high content of lime in the Ethan soil. Alfalfa, intermediate wheatgrass, and smooth bromegrass are the best suited species.

These soils are well suited to range. The native vegetation dominantly is green needlegrass and western wheatgrass. Overused areas are dominated by western wheatgrass, blue grama, and Kentucky bluegrass.

These soils are fairly well suited to windbreaks and environmental plantings. Except for those species that can grow well only if the supply of moisture is high, all climatically suited trees and shrubs grow well on the Clarno soil. No trees or shrubs grow well on the Ethan soil; optimum survival and vigor are unlikely. Planting on the contour helps to control erosion.

Because of the shrink-swell potential, these soils are only fairly well suited to most kinds of building site development. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings, however, help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage. Land shaping is needed in some areas.

Because of the slope and the restricted permeability, these soils are only fairly well suited to sanitary facilities. Enlarging the absorption area in septic tank absorption fields helps to overcome the slow absorption of liquid waste. Land shaping and installation of the distribution lines across the slope generally improve the efficiency of the absorption field.

The Clarno soil is in capability unit IIIe-2, the Ethan soil in capability unit IVe-3; both soils are in Silty range site.

Da—DeGrey-Jerauld silt loams. These deep, moderately well drained, nearly level soils are on uplands. The DeGrey soil is in plane areas, and the Jerauld soil is in slight depressions. Both soils have a

claypan subsoil and some microrelief. Areas are 10 to more than 600 acres in size and are irregular in shape. They are 45 to 55 percent DeGrey soil and 25 to 35 percent Jerauld soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the DeGrey soil is dark grayish brown silt loam about 6 inches thick. The subsurface layer is grayish brown silt loam about 2 inches thick. The subsoil is about 16 inches of dark grayish brown and light olive brown, very firm silty clay and silty clay loam. It is calcareous in the lower part. The underlying material to a depth of 60 inches is calcareous and has nests of gypsum and threads of salts. It is light olive brown silty clay loam over grayish brown clay loam. In places the subsoil does not have columnar structure.

Typically, the surface layer of the Jerauld soil is grayish brown silt loam about 3 inches thick. The subsoil is dark grayish brown and brown, very firm clay about 15 inches thick. In the lower part it is calcareous and has visible salt crystals. The underlying material to a depth of 60 inches is multicolored, calcareous clay loam. It has soft accumulations of carbonate in the upper part.

Included with these soils in mapping are small areas of Eakin and Hoven soils. These included soils make up less than 20 percent of any one mapped area. The well drained Eakin soils are on the higher parts of the landscape. They do not have a sodium affected subsoil. The poorly drained Hoven soils are in depressions.

Fertility is low in the DeGrey and Jerauld soils. Organic matter content is moderate in the DeGrey soil and low in the Jerauld soil. Tilth is poor in both soils. Permeability is slow. Available water capacity is moderate in the DeGrey soil and low or moderate in the Jerauld soil. Runoff is slow on both soils. The shrink-swell potential is high.

Most of the acreage supports native grasses. These soils are only fairly well suited to range because the dense, compact subsoil limits productivity and the variety of suitable grasses. The native vegetation dominantly is western wheatgrass, blue grama, and green needlegrass. Blue grama is more prevalent on the Jerauld soil than on the DeGrey soil. Overused areas are dominated by blue grama, buffalograss, and saltgrass. After continued overuse, many areas are bare. Restricted use during wet periods helps to prevent surface compaction and poor tilth.

This map unit is poorly suited to tame pasture and hay. Alfalfa, intermediate wheatgrass, and pubescent wheatgrass can be grown on the DeGrey soil, but very little production can be expected on the Jerauld soil.

This map unit is poorly suited to cultivated crops. Crop growth is severely restricted in the DeGrey soil because of the dense, sodium affected subsoil. No crops grow well on the Jerauld soil. The main management concern is improving tilth. Early maturing small grain is better suited than row crops. Tilling when the soil is wet causes compaction of the subsoil. Minimizing tillage, applying manure, subsoiling, and leaving crop residue on the surface conserve moisture and improve tilth.

The DeGrey soil is poorly suited and the Jerauld soil generally unsuited to windbreaks and environmental plantings. No trees or shrubs grow well on the Jerauld soil. Windbreaks can be established, but optimum growth is unlikely.

The Jerauld soil generally is unsuited to building site development. The DeGrey soil is suitable, but its shrink-swell potential is a limitation. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage.

Because of the restricted permeability, these soils are poorly suited to septic tank absorption fields. These fields generally do not function well unless they are greatly enlarged. Sewage lagoons are a suitable alternative sewage disposal system.

The DeGrey soil is in capability unit IVs-2, Claypan range site; the Jerauld soil is in capability unit VIs-1, Thin Claypan range site.

Db—DeGrey-Walke silt loams. These deep, moderately well drained, nearly level soils are on uplands. The DeGrey soil is in small, shallow depressions. The Walke soil is on slight rises and on toe slopes. Areas are 10 to more than 1,000 acres in size and are irregular in shape. They are 40 to 50 percent DeGrey soil and 30 to 40 percent Walke soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the DeGrey soil is dark grayish brown silt loam about 6 inches thick. The subsurface layer is grayish brown silt loam about 2 inches thick. The subsoil is about 16 inches of dark grayish brown and light olive brown, very firm silty clay and silty clay loam. It is calcareous in the lower part. The underlying material to a depth of 60 inches is calcareous and has nests of gypsum and threads of salts. It is light olive brown silty clay loam over grayish brown clay loam.

Typically, the surface layer of the Walke soil is dark gray silt loam about 3 inches thick. The subsurface layer is dark grayish brown silt loam about 5 inches thick. Below this is a transitional layer of grayish brown and gray silty clay loam about 3 inches thick. The subsoil is dark grayish brown and grayish brown, firm silty clay about 19 inches thick. The underlying material to a depth of 60 inches is calcareous and has a few medium nests of gypsum. It is light yellowish brown silty clay loam over pale yellow clay loam.

Included with these soils in mapping are small areas of Eakin, Highmore, Hoven, and Jerauld soils. These included soils make up less than 20 percent of any one mapped area. The well drained Eakin and Highmore soils are on the higher parts of the landscape. They do not have a sodium affected subsoil. The poorly drained Hoven soils are in depressions. Jerauld soils have a thin surface layer. They are in slight depressions.

Fertility is medium and organic matter content moderate in the DeGrey and Walke soils. Both soils contain detrimental amounts of sodium. Tilth is poor in the DeGrey soil and fair in the Walke soil. Permeability is slow in the DeGrey soil and moderately slow or slow in the Walke soil. Available water capacity is moderate in both soils. Runoff is slow. The shrink-swell potential is high in the subsoil and moderate in the underlying material.

Most of the acreage is cropland. These soils are poorly suited to cultivated crops. The best suited crops are those that are tolerant of drought and sodium salts. Early maturing small grain is better suited than corn. The main concerns of management are improving tilth, increasing the rate of water intake, and conserving moisture. Subsoiling helps to break up the dense claypan subsoil and increases the rate of water intake for a short time. Leaving crop residue on the surface, including grasses and legumes in the cropping system, and applying animal manure conserve moisture and improve tilth. Planting green manure crops also improves tilth and increases the content of organic matter.

These soils are only fairly well suited to tame pasture and hay (fig. 6). Only those species that can grow in a soil that has a claypan subsoil and contains sodium salts are suitable. Alfalfa, crested wheatgrass, intermediate wheatgrass, pubescent wheatgrass, and western wheatgrass are examples.

These soils are fairly well suited to range. The native vegetation dominantly is western wheatgrass, green needlegrass, and blue grama. Overused areas are dominated by blue grama and saltgrass interspersed with bare spots.

The DeGrey soil is poorly suited to windbreaks and environmental plantings. Optimum growth, survival, and vigor are unlikely. Trees and shrubs can grow successfully on the Walke soil.

These soils are suitable for building site development, but the high shrink-swell potential is a limitation. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage.

Because of the restricted permeability, these soils are poorly suited to septic tank absorption fields. These fields generally do not function well unless they are greatly enlarged. Sewage lagoons are a suitable alternative.

Figure 6.—Uneven alfalfa stand in an area of DeGrey-Walke silt loams.

The DeGrey soil is in capability unit IVs-2, Claypan range site; the Walke soil is in capability unit IIIs-1, Clayey range site.

DmC—Delmont-Talmo complex, 2 to 9 percent slopes. These undulating and gently rolling soils are in areas on uplands where slopes generally are short and complex and poorly defined drainageways are typical. The somewhat excessively drained Delmont soil is on the sides and tops of the broader ridges. The excessively drained Talmo soil is on the steeper and more convex upper slopes. The Delmont soil is shallow over gravelly sand, and the Talmo soil is very shallow over gravelly sand. Areas are 5 to several hundred acres in size and are irregular in shape. They are 45 to 55 percent Delmont soil and 30 to 40 percent Talmo soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Delmont soil is very dark grayish brown loam about 5 inches thick. The subsoil is about 12 inches of very dark grayish brown and dark brown loam and gravelly loam. The underlying material to a depth of 60 inches is multicolored, calcareous gravelly sand. In places the gravelly sand is below a depth of 20 inches.

Typically, the surface layer of the Talmo soil is dark grayish brown gravelly loam about 7 inches thick. The underlying material to a depth of 60 inches is multicolored, calcareous gravelly sand.

Included with these soils in mapping are small areas of Arlo and Betts soils. These included soils make up less than 20 percent of any one mapped area. The very poorly drained Arlo soils are in swales. Betts soils formed in glacial till and are along the edge of the mapped areas.

Fertility is medium in the Delmont soil and low in the Talmo soil. Organic matter content is moderate in the Delmont soil and low in the Talmo soil. Permeability is moderate or moderately rapid in the subsoil of the Delmont soil and rapid in the underlying material. It is rapid in the Talmo soil. Available water capacity is low in both soils. Runoff is medium on the Delmont soil and slow on the Talmo soil.

Most of the acreage supports native grasses. These soils are fairly well suited to range. The native vegetation dominantly is needleandthread and grama grasses. Overused areas are dominated by blue grama, threadleaf sedge, and weeds. If the range is severely overgrazed, the surface is bare in spots.

Because of droughtiness, the Delmont soil is poorly suited and the Talmo soil generally unsuited to cultivated crops, windbreaks and environmental plantings, and tame pasture and hay. Crested wheatgrass can be grown in the gently sloping areas of the Delmont soil. Some trees and shrubs can be established for special purposes if they are planted by hand and given special care.

These soils are fairly well suited to most kinds of building site development. The sides of shallow excavations tend to cave in unless they are shored. Land shaping is needed in some of the steeper areas of the Talmo soil. Both soils readily absorb but do not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity may result in the pollution of shallow ground water. The soils are a probable source of sand and gravel for use as road construction material.

The Delmont soil is in capability unit IVe-6, Shallow to Gravel range site; the Talmo soil is in capability unit VIs-4, Very Shallow range site.

DnA—Dorna silt loam, 0 to 4 percent slopes. This deep, well drained, nearly level and gently sloping soil is on uplands near the Missouri River. Areas are 40 to 200 acres in size and are irregular in shape. Slopes are long and smooth.

Typically, the surface layer is grayish brown silt loam about 8 inches thick. The subsurface layer is grayish brown, calcareous silt loam about 7 inches thick. The upper 6 inches of the underlying material is pale brown silt loam. The lower part to a depth of 60 inches is grayish brown silty clay that has accumulations of carbonate. In places the soil is not underlain by silty clay.

Included with this soil in mapping are small areas of Promise soils on colluvial fans. These soils make up less than 15 percent of any one mapped area. They are clayey throughout.

Fertility is medium and organic matter content moderate in the Dorna soil. Permeability is moderate in the upper part of the soil and slow in the underlying silty clay. Available water capacity is high. Runoff is slow. The shrink-swell potential is high in the underlying silty clay.

About half of the acreage is cropland. This soil is well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Measures that control erosion and conserve moisture are the main management needs. Leaving crop residue on the surface is an example.

This soil is well suited to range. The native vegetation dominantly is western wheatgrass, green needlegrass, and big bluestem. Overused areas are dominated by western wheatgrass and blue grama. After continued overuse, Kentucky bluegrass, blue grama, and weeds dominate the site.

This soil is well suited to windbreaks and environmental plantings. All climatically suited trees and shrubs grow well, except for those that require an abundant supply of moisture.

This soil is only fairly well suited to most kinds of building site development because the shrink-swell potential is a limitation. Backfilling with sandy material, providing foundation drains, and diverting runoff away

from the buildings, however, help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage. The soil generally is unsuitable as a septic tank absorption field because of the very restricted permeability.

The capability unit is IIe-1; Silty range site.

Du—Durrstein silt loam. This deep, poorly drained, nearly level soil is on flood plains along drainageways on glacial till plains. It is subject to rare flooding for very brief periods in the spring. Areas are 5 to 400 acres in size and generally are long and narrow. Slopes are smooth and slightly concave.

Typically, the surface layer is gray silt loam about 1 inch thick. The subsoil is dark gray and gray, firm silty clay about 15 inches thick. In the lower part it has nests of gypsum and threads of salts. The underlying material to a depth of 60 inches is gray, firm, calcareous silty clay. It has accumulations of carbonate and nests of gypsum.

Included with this soil in mapping are small areas of the moderately well drained DeGrey and well drained Eakin soils on slight rises. These soils make up less than 10 percent of any one mapped area.

Fertility and organic matter content are low in the Durrstein soil. The sodium in this soil adversely affects the growth of most plants. Tilth is poor. Permeability is slow. Available water capacity is moderate. A seasonal high water table is at a depth of 3 to 5 feet. Runoff is slow. The shrink-swell potential is high.

Most areas support native grasses. This soil is fairly well suited to range. The native vegetation dominantly is western wheatgrass, cordgrass, and inland saltgrass. Overused areas are dominated by inland saltgrass and weeds.

This soil generally is too wet and too saline for cultivated crops. It is poorly suited to tame pasture and hay and windbreaks and environmental plantings. The choice of pasture plants is limited by the wetness and the high degree of salinity. Examples of suitable pasture plants are tall wheatgrass and western wheatgrass. Windbreaks and environmental plantings can be established, but optimum survival, growth, and vigor are unlikely.

Because of the wetness and the flooding, this soil generally is unsuited to building site development and most sanitary facilities.

The capability unit is VIw-4; Saline Lowland range site.

EaA—Eakin silt loam, 0 to 2 percent slopes. This deep, well drained, nearly level soil is on uplands. Areas are 20 to 200 acres in size and are irregular in shape.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is grayish brown and light olive brown, friable silty clay loam about 22 inches thick. In the lower part it is calcareous and has soft accumulations of carbonate that extend into the underlying material. The underlying material to a depth of 60 inches is pale olive, calcareous clay loam. In places clay loam glacial till is below a depth of 40 inches.

Included with this soil in mapping are small areas of Ethan, Onita, Tetonka, and Walke soils. These soils make up less than 15 percent of any one mapped area. Ethan soils have lime within a depth of 9 inches. They are on slight rises. The moderately well drained Onita soils are in swales. The poorly drained Tetonka soils are in depressions. Walke soils have a sodium affected subsoil. They are in slight depressions.

Fertility is medium and organic matter content moderate in the Eakin soil. Permeability is moderate in the subsoil and moderately slow in the underlying glacial till. Available water capacity is high. Runoff is slow. The shrink-swell potential is moderate.

Most of the acreage is cropland. This soil is well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and bromegrass. Measures that conserve moisture are the main management needs. Leaving crop residue on the surface is an example.

This soil is well suited to range. The native vegetation dominantly is western wheatgrass, big bluestem, and green needlegrass. Overused areas are dominated by western wheatgrass and needleandthread. After continued overuse, Kentucky bluegrass and weeds dominate the site.

This soil is well suited to windbreaks and environmental plantings. Except for those species that can grow well only if the supply of moisture is high, all climatically suited trees and shrubs grow well.

This soil is only fairly well suited to building site development because the shrink-swell potential is a limitation. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings, however, help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage.

Because of the restricted permeability, this soil is only fairly well suited to septic tank absorption fields. Enlarging the absorption area, however, helps to overcome the slow absorption of liquid waste.

The capability unit is IIc-2; Silty range site.

EbB—Eakin-Beadle complex, 2 to 6 percent slopes. These deep, well drained, undulating soils are on uplands. The Eakin soil is on side slopes. The Beadle soil is on the tops of knolls. Scattered stones are on the surface in places. Areas are 10 to more than 900 acres in size and are irregular in shape. They are 40 to 50 percent Eakin soil and 35 to 45 percent Beadle soil. The two soils occur as areas so intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Eakin soil is dark grayish brown silt loam about 7 inches thick. The subsoil

is grayish brown and light olive brown, friable silty clay loam about 22 inches thick. In the lower part it is calcareous and has soft accumulations of carbonate that extend into the underlying material. The underlying material to a depth of 60 inches is pale olive, calcareous clay loam.

Typically, the surface layer of the Beadle soil is dark grayish brown loam about 6 inches thick. The subsoil is dark grayish brown and grayish brown, firm clay loam about 24 inches thick. In the lower part it is calcareous and has soft accumulations of carbonate that extend into the underlying material. The underlying material to a depth of 60 inches is light brownish gray, calcareous clay loam. It has soft accumulations of carbonate in the upper part. In places free carbonates are within a depth of 12 inches.

Included with these soils in mapping are small areas of DeGrey, Hoven, Jerauld, and Onita soils. These included soils make up less than 15 percent of any one mapped area. DeGrey and Jerauld soils have a sodium affected subsoil. They are in microdepressions. The poorly drained Hoven soils are in depressions. The moderately well drained Onita soils are in swales.

Fertility is medium and organic matter content moderate in the Eakin and Beadle soils. Tilth is fair in the Beadle soil. Permeability is moderate in the subsoil of the Eakin soil and moderately slow in the underlying material. It is moderately slow in the Beadle soil. Available water capacity is high in both soils. Runoff is medium. The shrink-swell potential is moderate in the Eakin soil and high in the Beadle soil.

Most of the acreage is cropland. The Eakin soil is well suited and the Beadle soil only fairly well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and bromegrass. The main concerns of management are conserving moisture and controlling erosion. Leaving crop residue on the surface and including grasses and legumes in the cropping system help to control erosion, conserve moisture, and improve fertility. Contour farming, grassed waterways, and terraces also can help to control erosion, but the slopes in some areas are too short or too irregular for contouring or terracing.

These soils are well suited to range. The native vegetation dominantly is bluestems, green needlegrass, and western wheatgrass. Overused areas are dominated by western wheatgrass, blue grama, and Kentucky bluegrass. After continued overuse, Kentucky bluegrass and weeds dominate the site.

This map unit is fairly well suited to windbreaks and environmental plantings. Except for those species that require an abundant supply of moisture, most climatically suited trees and shrubs grow well.

These soils are suitable for building site development, but the moderate shrink-swell potential of the Eakin soil and the high shrink-swell potential of the Beadle soil are limitations. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage.

Because of the restricted permeability, these soils are poorly suited to septic tank absorption fields. Enlarging the absorption area, however, helps to overcome the slow absorption of liquid waste.

The Eakin soil is in capability unit IIe-2, Silty range site; the Beadle soil is in capability unit IIIe-3, Clayey range site.

EdA—Eakin-DeGrey silt loams, 0 to 4 percent slopes. These deep, gently undulating and undulating soils are on uplands. The well drained Eakin soil is in convex areas. The moderately well drained DeGrey soil is in plane and slightly concave areas. Areas are 10 to 1,000 acres in size and are irregular in shape. They are 45 to 55 percent Eakin soil and 20 to 30 percent DeGrey soil. The two soils occur as areas so intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Eakin soil is dark grayish brown silt loam about 7 inches thick. The subsoil is grayish brown and light olive brown, friable silty clay loam about 22 inches thick. In the lower part it is calcareous and has soft accumulations of carbonate that extend into the underlying material. The underlying material to a depth of 60 inches is pale olive, calcareous clay loam.

Typically, the surface layer of the DeGrey soil is dark grayish brown silt loam about 6 inches thick. The subsurface layer is grayish brown silt loam about 2 inches thick. The subsoil is about 16 inches of dark grayish brown and light olive brown, very firm silty clay and silty clay loam. It is calcareous in the lower part. The underlying material to a depth of 60 inches is calcareous and has nests of gypsum crystals and threads of salts. It is light olive brown silty clay loam over grayish brown clay loam.

Included with these soils in mapping are small areas of Ethan, Hoven, and Onita soils. These included soils make up less than 20 percent of any one mapped area. The loamy Ethan soils are on low mounds and ridges. The poorly drained Hoven soils are in depressions. The moderately well drained Onita soils are in swales. They are dark to a depth of more than 20 inches.

Fertility is medium in the Eakin and DeGrey soils. Organic matter content is moderate. The sodium in the DeGrey soil adversely affects the growth of most plants. Tilth is poor in this soil. Permeability is moderate in the subsoil of the Eakin soil and moderately slow in the underlying material. It is slow in the DeGrey soil. Available water capacity is high in the Eakin soil and moderate in the DeGrey soil. Runoff is slow on both soils. The shrink-swell potential is moderate in the Eakin soil and high in the DeGrey soil.

About half of the acreage is cropland. The Eakin soil is well suited and the DeGrey soil poorly suited to

cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and pubescent wheatgrass. The sodium affected subsoil in the DeGrey soil restricts the root zone and the rate of water intake. The main concerns of management are conserving moisture and controlling erosion on the Eakin soil and increasing the rate of water intake and improving tilth in the DeGrey soil. Leaving crop residue on the surface helps to control erosion and conserves moisture. Subsoiling and including grasses and legumes in the cropping system improve tilth and increase the rate of water intake.

These soils are well suited to range. The native vegetation dominantly is western wheatgrass and green needlegrass. Overused areas are dominated by western wheatgrass and blue grama. After continued overuse, blue grama, buffalograss, Kentucky bluegrass, and weeds dominate the site.

The Eakin soil is well suited and the DeGrey soil poorly suited to windbreaks and environmental plantings. The sodium affected subsoil of the DeGrey soil restricts root penetration and thus the growth of trees. Windbreaks can be established on this soil, but optimum growth is unlikely. All climatically suited trees and shrubs grow well on the Eakin soil.

These soils are suitable for building site development, but the moderate shrink-swell potential of the Eakin soil and the high shrink-swell potential of the DeGrey soil are limitations. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage.

Because of the restricted permeability, the Eakin soil is only fairly well suited and the DeGrey soil poorly suited to septic tank absorption fields. Enlarging the absorption area, however, helps to overcome the slow absorption of liquid waste.

The Eakin soil is in capability unit IIe-2, Silty range site; the DeGrey soil is in capability unit IVs-2, Claypan range site.

EeB—Eakin-Ethan complex, 2 to 6 percent slopes. These deep, well drained, undulating soils are in areas on uplands where slopes generally are short and complex. The Eakin soil is on side slopes. The Ethan soil is on knolls and ridges. Areas are 20 to 800 acres in size and are irregular in shape. They are 50 to 60 percent Eakin soil and 20 to 30 percent Ethan soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Eakin soil is dark grayish brown silt loam about 7 inches thick. The subsoil is grayish brown and light olive brown, friable silty clay loam about 22 inches thick. In the lower part it is calcareous and has soft accumulations of carbonate that extend into the underlying material. The underlying material to a depth of 60 inches is pale olive, calcareous clay loam.

Typically, the surface layer of the Ethan soil is dark grayish brown, calcareous loam about 6 inches thick. The subsoil is dark grayish brown and light gray, friable, calcareous loam about 15 inches thick. The underlying material to a depth of 60 inches is light gray, calcareous clay loam. In places the surface layer is less than 5 inches thick.

Included with these soils in mapping are small areas of Onita, Tetonka, and Walke soils. These included soils make up less than 20 percent of any one mapped area. The moderately well drained Onita soils are in swales. They are dark to a depth of more than 20 inches. The poorly drained Tetonka soils are in depressions. Walke soils have a sodium affected subsoil. They are in slight depressions.

Organic matter content is moderate and fertility medium in the Eakin soil. Organic matter content and fertility are low in the Ethan soil. Permeability is moderate in the subsoil of both soils and moderately slow in the underlying material. Available water capacity is high. Runoff is medium. The shrink-swell potential is moderate.

Most of the acreage is cropland. These soils are well suited to cultivated crops. The main concerns of management are controlling erosion and conserving moisture. Increasing the organic matter content and improving fertility are other concerns because the high content of lime in the surface layer of the Ethan soil adversely affects the availability of plant nutrients. Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to control erosion, conserve moisture, increase the content of organic matter, and improve fertility. Contour farming, grassed waterways, and terraces also can help to control erosion, but in some areas slopes are too short or too irregular for contouring and terracing.

These soils are well suited to tame pasture and hay. Alfalfa, intermediate wheatgrass, and smooth bromegrass are the best suited species.

These soils are fairly well suited to windbreaks and environmental plantings. Except for those species that can grow well only if the supply of moisture is high, all climatically suited trees and shrubs grow well on the Eakin soil. Trees and shrubs can be established on the Ethan soil, but optimum survival, growth, and vigor are unlikely.

These soils are well suited to range. The native vegetation dominantly is green needlegrass and western wheatgrass. Overused areas are dominated by blue grama, Kentucky bluegrass, and weeds.

These soils are fairly well suited to most kinds of building site development and sanitary facilities. The shrink-swell potential is a limitation on building sites, and the restricted permeability is a limitation in septic tank absorption fields. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings help to prevent the structural damage

caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage. Enlarging the absorption area in septic tank absorption fields helps to overcome the slow absorption of liquid waste.

The Eakin soil is in capability unit IIe-2, the Ethan soil in capability unit IIIe-12; both soils are in Silty range site.

EeC—Eakin-Ethan complex, 6 to 9 percent slopes. These deep, well drained, gently rolling soils are in areas on uplands where slopes generally are short and complex. The Eakin soil is on smooth side slopes and the broader ridgetops. The Ethan soil is on the convex tops and shoulders of ridges. Areas are 10 to 300 acres in size and are irregular in shape. They are 45 to 55 percent Eakin soil and 25 to 35 percent Ethan soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Eakin soil is dark grayish brown silt loam about 7 inches thick. The subsoil is grayish brown and light olive brown, friable silty clay loam about 22 inches thick. In the lower part it is calcareous and has soft accumulations of carbonate that extend into the underlying material. The underlying material to a depth of 60 inches is pale olive, calcareous clay loam.

Typically, the surface layer of the Ethan soil is dark grayish brown, calcareous loam about 6 inches thick. The subsoil is dark grayish brown and light gray, friable, calcareous loam about 15 inches thick. The underlying material to a depth of 60 inches is light gray, calcareous clay loam. In places the surface layer is less than 5 inches thick.

Included with these soils in mapping are small areas of Onita and Tetonka soils. These included soils make up less than 15 percent of any one mapped area. The moderately well drained Onita soils are in swales. The poorly drained Tetonka soils are in depressions.

Organic matter content is moderate and fertility medium in the Eakin soil. Organic matter content and fertility are low in the Ethan soil. Permeability is moderate in the subsoil of both soils and moderately slow in the underlying material. Available water capacity is high. Runoff is medium. The shrink-swell potential is moderate.

Most of the acreage is cropland. These soils are fairly well suited to cultivated crops and well suited to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. The main concerns of management are controlling erosion and conserving moisture. Improving fertility also is a concern because the high content of lime in the surface layer of the Ethan soil adversely affects the availability of plant nutrients. Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to control erosion, conserve moisture, and improve fertility. Contour farming, grassed waterways, and terraces also can help to control erosion, but in some areas slopes are too short or too irregular for contouring and terracing.

These soils are fairly well suited to windbreaks and environmental plantings. Except for those species that can grow well only if the supply of moisture is high, all climatically suited trees and shrubs grow well on the Eakin soil. Trees and shrubs can be established on the Ethan soil, but optimum survival, growth, and vigor are unlikely. Planting on the contour helps to control erosion.

These soils are well suited to range. The native vegetation dominantly is green needlegrass and western wheatgrass. Overused areas are dominated by blue grama and Kentucky bluegrass.

Because of the slope and the moderate shrink-swell potential, these soils are only fairly well suited to most kinds of building site development. Buildings should be designed to conform to the natural slope of the land. Land shaping is needed in some areas. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage.

Because of the slope and the restricted permeability, these soils are only fairly well suited to septic tank absorption fields. Enlarging the absorption area in these fields helps to overcome the slow absorption of liquid waste. Land shaping and installation of the distribution lines across the slope generally improve the efficiency of the absorption field.

The Eakin soil is in capability unit IIIe-2, the Ethan soil in capability unit IVe-3; both soils are in Silty range site.

EmA—Enet loam, 0 to 2 percent slopes. This well drained, nearly level soil is on terraces along the major drainageways. It is moderately deep over gravelly material. Areas are 10 to 200 acres in size and are long and narrow or irregularly shaped.

Typically, the surface layer is very dark grayish brown loam about 7 inches thick. The subsoil is about 23 inches thick. It is dark grayish brown, friable loam over grayish brown, calcareous sandy loam that has accumulations of carbonate. The upper part of the underlying material is very pale brown, calcareous gravelly loamy sand. The lower part to a depth of 60 inches is multicolored, calcareous gravelly sand. In places the subsoil is silty clay loam. In some areas the gravelly material is within a depth of 20 inches.

Included with this soil in mapping are small areas of Prosper and Arlo soils. These soils make up less than 10 percent of any one mapped area. The moderately well drained Prosper soils are in swales. The poorly drained Arlo soils are in slight depressions. They are calcareous throughout.

Fertility is medium and organic matter content moderate in the Enet soil. Permeability is moderate in the subsoil and rapid in the gravelly underlying material.

Available water capacity is low or moderate. Runoff is slow.

Most of the acreage is cropland. This soil is only fairly well suited to cultivated crops because it is droughty. Measures that conserve moisture are the main management needs. Examples are leaving crop residue on the surface and including grasses and legumes in the cropping system.

This soil is only fairly well suited to tame pasture and hay. Only those grasses that are drought resistant are suitable. Crested wheatgrass and pubescent wheatgrass are examples.

This soil is well suited to range. The natural vegetation dominantly is green needlegrass and western wheatgrass. Overused areas are dominated by blue grama and Kentucky bluegrass. After continued overuse, Kentucky bluegrass and weeds dominate the site.

This soil is poorly suited to windbreaks and environmental plantings. Trees and shrubs can be established, but optimum survival, growth, and vigor are unlikely.

This soil is well suited to most kinds of building site development, but the sides of shallow excavations tend to cave in unless they are shored. The soil readily absorbs the effluent from septic tank absorption fields, but it does not adequately filter the effluent. The poor filtering capacity may result in the pollution of ground water. The soil is a probable source of sand and gravel for use as road construction material.

The capability unit is IIIs-2; Silty range site.

EnC—Enet-Delmont loams, 2 to 9 percent slopes. These gently sloping and moderately sloping soils are in areas on uplands where slopes generally are long and smooth. The well drained Enet soil is on side slopes. The somewhat excessively drained Delmont soil is on the steeper slopes and on knolls. The Enet soil is moderately deep and the Delmont soil shallow over gravelly material. Areas are 10 to 120 acres in size and are irregular in shape. They are about 45 to 55 percent Enet soil and 35 to 45 percent Delmont soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Enet soil is very dark grayish brown loam about 7 inches thick. The subsoil is about 23 inches thick. It is dark grayish brown, friable loam over grayish brown, calcareous sandy loam that has accumulations of carbonate. The upper part of the underlying material is very pale brown, calcareous gravelly loamy sand. The lower part to a depth of 60 inches is multicolored, calcareous gravelly sand.

Typically, the surface layer of the Delmont soil is very dark grayish brown loam about 5 inches thick. The subsoil is about 12 inches of very dark grayish brown and dark brown, friable loam and gravelly loam. The underlying material to a depth of 60 inches is multicolored, calcareous gravelly sand. In places the gravelly sand is within a depth of 10 inches.

Included with these soils in mapping are small areas of Arlo, Prosper, and Tetonka soils. These included soils make up less than 15 percent of any one mapped area. The moderately well drained Prosper soils are in swales. The poorly drained Arlo soils are in slight depressions. The poorly drained Tetonka soils are in depressions. They are not underlain by gravel.

Organic matter content is moderate and fertility medium in the Enet and Delmont soils. Permeability is moderate in the upper part of the soils and rapid in the underlying sand and gravel. Available water capacity is low. Runoff is medium.

Most of the acreage supports native grasses. These soils are only fairly well suited to range because they are droughty. The native vegetation dominantly is bluestems and needlegrasses. Overused areas are dominated by western wheatgrass, blue grama, and threadleaf sedge. After continued overuse, Kentucky bluegrass, blue grama, and weeds dominate the site.

These soils are poorly suited to cultivated crops. They are droughty because they are shallow or moderately deep to gravelly material. They are better suited to small grain and grasses than to late maturing crops, such as corn. Measures that control erosion and conserve moisture are the main management needs. Examples are leaving crop residue on the surface and including grasses and legumes in the cropping system.

A cover of tame pasture plants or hay is effective in controlling erosion, but these soils are only fairly well suited to tame pasture and hay. Only those grasses that are drought resistant are suitable. Crested wheatgrass and pubescent wheatgrass are examples.

These soils are poorly suited to windbreaks and environmental plantings. Trees and shrubs can be established, but optimum survival, growth, and vigor are unlikely.

These soils are well suited to most kinds of building site development, but the sides of shallow excavations tend to cave in unless they are shored. The soils readily absorb the effluent from septic tank absorption fields, but they do not adequately filter the effluent. The poor filtering capacity may result in the pollution of ground water. The soils are a probable source of sand and gravel for use as road construction material.

The Enet soil is in capability unit IVe-5, Silty range site; the Delmont soil is in capability unit VIe-5, Shallow to Gravel range site.

EtD—Ethan-Clarno loams, 9 to 15 percent slopes. These deep, well drained, strongly sloping soils are in areas on uplands where slopes generally are short and complex. The Ethan soil is steeper than the Clarno soil and is higher on the landscape. Scattered glacial stones commonly are on the surface. Areas are 20 to 300 acres in size and are long and narrow or irregularly shaped. They are 40 to 50 percent Ethan soil and 35 to 45 percent Clarno soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Ethan soil is dark grayish brown, calcareous loam about 6 inches thick. The subsoil is dark grayish brown and light gray, friable, calcareous loam about 15 inches thick. The underlying material to a depth of 60 inches is light gray, calcareous clay loam. In places the surface layer is less than 5 inches thick.

Typically, the surface layer of the Clarno soil is very dark grayish brown loam about 7 inches thick. The subsoil is dark grayish brown and light brownish gray, friable loam about 17 inches thick. It is calcareous in the lower part. The underlying material to a depth of 60 inches is light brownish gray, calcareous loam. It has soft accumulations of carbonate in the upper part.

Included with these soils in mapping are small areas of Bon, Eakin, and Prosper soils. These included soils make up less than 15 percent of any one mapped area. The moderately well drained Bon and Prosper soils are in drainageways and swales. Eakin soils are silty. They are in a random pattern throughout the mapped areas.

Organic matter content and fertility are low in the Ethan soil. Organic matter content is moderate and fertility medium in the Clarno soil. Permeability is moderate in the subsoil of both soils and moderately slow in the underlying material. Available water capacity is high. Runoff is medium. The shrink-swell potential is moderate.

Most areas support native grasses. These soils are well suited to range. The native vegetation dominantly is green needlegrass, little bluestem, and western wheatgrass on the Ethan soil and green needlegrass and western wheatgrass on the Clarno soil. Overused areas are dominated by blue grama and Kentucky bluegrass.

These soils are fairly well suited to tame pasture and hay. Alfalfa, intermediate wheatgrass, smooth bromegrass, and pubescent wheatgrass are suitable.

These soils are poorly suited to windbreaks and environmental plantings and to cultivated crops because of the slope. In areas of the Clarno soil, trees and shrubs can be planted for special purposes, such as wildlife habitat.

Because of the shrink-swell potential and the slope, these soils are only fairly well suited to most kinds of building site development. Buildings should be designed to conform to the natural slope of the land. Land shaping is needed in some areas. Reseeding and shaping slopes that have been cut during construction can help to prevent excessive erosion. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage.

Because of the restricted permeability and the slope, these soils are only fairly well suited to sanitary facilities. Enlarging the absorption area in septic tank absorption fields helps to overcome the slow absorption of liquid waste. Land shaping and installation of the distribution lines across the slope generally improve the efficiency of the absorption field.

The capability unit is VIe-3; Silty range site.

EuC—Ethan-Homme complex, 6 to 9 percent slopes. These deep, well drained, gently rolling soils are in areas on uplands where slopes generally are short and complex. The Ethan soil is on convex ridges. The Homme soil is on side slopes. Areas are 10 to 150 acres in size and are long and narrow or irregularly shaped. They are about 65 to 75 percent Ethan soil and 15 to 25 percent Homme soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Ethan soil is dark grayish brown, calcareous loam about 6 inches thick. The subsoil is dark grayish brown and light gray, friable, calcareous loam about 15 inches thick. The underlying material to a depth of 60 inches is light gray, calcareous clay loam. In places the surface layer is less than 5 inches thick.

Typically, the surface layer of the Homme soil is very dark grayish brown silty clay loam about 8 inches thick. The subsoil is dark brown, brown, and pale brown, friable and firm silty clay loam about 30 inches thick. It is calcareous in the lower part. The underlying material to a depth of 60 inches is light yellowish brown, calcareous clay loam.

Included with these soils in mapping are small areas of Chancellor, Davison, Onita, and Tetonka soils. These included soils make up less than 10 percent of any one mapped area. The poorly drained Chancellor and moderately well drained Onita soils are in swales. The moderately well drained Davison soils are at the base of some slopes. The poorly drained Tetonka soils are in depressions.

Organic matter content and fertility are low in the Ethan soil. Organic matter content is moderate and fertility medium in the Homme soil. Permeability is moderate in the upper part of the Ethan soil and moderately slow in the underlying glacial till. It is moderately slow in the Homme soil. Available water capacity is high in both soils. Runoff is medium. The shrink-swell potential is moderate in the Ethan soil and high in the Homme soil.

Most of the acreage is cropland. These soils are only fairly well suited to cultivated crops. The main concerns of management are controlling erosion and conserving moisture. Improving fertility also is a concern because the high content of lime in the surface layer of the Ethan soil adversely affects the availability of plant nutrients. Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to control erosion, conserve moisture, and improve fertility. Contour farming, grassed waterways, and terraces also can help to control erosion, but in some areas slopes are too short or too irregular for contouring and terracing.

The Ethan soil is only fairly well suited and the Homme soil well suited to tame pasture and hay. All climatically suited pasture plants grow well on the Homme soil, but they do not grow so well on the Ethan soil because of the high content of lime in the surface layer. The best suited pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass.

These soils are well suited to range. The native vegetation dominantly is green needlegrass and western wheatgrass. Overused areas are dominated by western wheatgrass and needleandthread. After continued overuse, Kentucky bluegrass and weeds dominate the site.

The Homme soil is well suited to windbreaks and environmental plantings, but the Ethan soil is poorly suited. Trees and shrubs can be established on the Ethan soil, but optimum survival, growth, and vigor are unlikely. Except for those species that can grow well only if the moisture supply is high, all climatically suited trees and shrubs grow well on the Homme soil.

These soils are fairly well suited to most kinds of building site development and sanitary facilities. The shrink-swell potential is a limitation on building sites, and the restricted permeability is a limitation in septic tank absorption fields. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage. Enlarging the absorption area in septic tank absorption fields helps to overcome the slow absorption of liquid waste.

The Ethan soil is in capability unit IVe-3, the Homme soil in capability unit IIIe-1; both soils are in Silty range site.

GsE—Gavins-Sansarc complex, 15 to 25 percent slopes. These shallow, well drained, moderately steep soils are on uplands. The Gavins soil is on the short lower side slopes, and the Sansarc soil is on the upper slopes (fig. 7). Areas are 10 to 200 acres in size and oblong or irregularly shaped. They are 65 to 75 percent Gavins soil and 20 to 30 percent Sansarc soil. The two soils occur as areas so intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Gavins soil is dark grayish brown silt loam about 5 inches thick. Below this is a transitional layer of brown, calcareous loam about 7 inches thick. The underlying material, to a depth of about 17 inches, is very pale brown, calcareous loam. Very pale brown and reddish yellow siltstone is at a depth of about 17 inches.

Typically, the surface layer of the Sansarc soil is dark grayish brown clay about 4 inches thick. The upper part of the underlying material is dark grayish brown, very firm clay. The lower part, to a depth of about 13 inches, is grayish brown shaly clay. Grayish brown shale is at a depth of about 13 inches. In places the soil is not so firm and contains less clay.

Figure 7.—An area of Gavins-Sansarc complex, 15 to 25 percent slopes, in the background. Wendte Variant silty clay is in the foreground.

Included with these soils in mapping are small areas of Betts and Boyd soils. These included soils make up less than 10 percent of any one mapped area. Betts soils formed in glacial till and are on the higher parts of the landscape. Boyd soils are 25 to 35 inches deep over shale. They are on the less sloping parts of the landscape.

Organic matter content and fertility are low in the Gavins and Sansarc soils. Permeability is moderate above the siltstone in the Gavins soil and slow in the Sansarc soil. Available water capacity is low in the Gavins soil and very low in the Sansarc soil. Runoff is rapid on both soils. The shrink-swell potential is low in the Gavins soil and very high in the Sansarc soil.

Most areas support native grasses. These soils are fairly well suited to range. The native vegetation dominantly is little bluestem, green needlegrass, sideoats grama, and western wheatgrass. Overused areas are dominated by blue grama, sedges, and weeds.

These soils generally are too steep and too shallow for cultivated crops, tame pasture and hay, windbreaks and environmental plantings, building site development, and sanitary facilities.

The Gavins soil is in capability unit VIe-11, Thin Upland range site; the Sansarc soil is in capability unit VIe-12, Shallow Clay range site.

Gv—Graceville silt loam. This deep, well drained, nearly level soil is on glacial outwash terraces. Areas are 10 to 130 acres in size and are irregularly shaped. Slopes are long and smooth.

Typically, the surface layer is very dark grayish brown silt loam about 19 inches thick. The subsoil is dark grayish brown, dark brown, and brown, firm and friable silty clay loam about 35 inches thick. The underlying material to a depth of 60 inches is brown gravelly sand. In places, the gravelly sand is 20 to 40 inches from the surface and the subsoil contains less silt and more sand.

Included with this soil in mapping are small areas of Delmont and Onita soils. These soils make up less than 10 percent of any one mapped area. Delmont soils are 14 to 20 inches deep over sand and gravel. They are on ridges. The moderately well drained Onita soils are in swales.

Organic matter content and fertility are high in the Graceville soil. Permeability is moderate in the subsoil and rapid in the underlying gravelly sand. Available water capacity is high. Runoff is slow. The shrink-swell potential is moderate.

Most of the acreage is cropland. This soil is well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and bromegrass. Measures that conserve moisture are the main management needs. Leaving crop residue on the surface is an example. The soil is well suited to irrigation.

This soil is well suited to range. The native vegetation dominantly is big bluestem, needlegrass, and western wheatgrass. Overused areas are dominated by western wheatgrass and Kentucky bluegrass. After continued overuse, Kentucky bluegrass and weeds dominate the site.

This soil is well suited to windbreaks and environmental plantings. Except for those species that require an abundant supply of moisture, all climatically suited trees and shrubs grow well.

This soil is only fairly well suited to building site development, mainly because the moderate shrink-swell potential is a limitation. Backfilling with sandy material helps to prevent the structural damage caused by shrinking and swelling. The sides of shallow excavations tend to cave in unless they are shored. The soil is well suited to septic tank absorption fields. It is a probable source of sand and gravel for use as road construction material.

The capability unit is IIc-2; Silty range site.

HaA—Hand loam, 0 to 2 percent slopes. This deep, well drained, nearly level soil is on uplands. Areas are 10 to 250 acres in size and are irregular in shape. Slopes generally are long and smooth.

Typically, the surface layer is dark gray loam about 8 inches thick. The subsoil is dark grayish brown and grayish brown, very friable and friable loam about 17 inches thick. It is calcareous in the lower part. The underlying material to a depth of 60 inches is grayish brown and brown, calcareous loam.

Included with this soil in mapping are small areas of Ethan, Henkin, Homme, and Prosper soils. These soils make up less than 15 percent of any one mapped area. Ethan soils formed in glacial till and are on knobs. Henkin soils contain more sand throughout than the Hand soil. They are in a random pattern throughout the mapped areas. Homme soils are on the higher parts of the landscape. Their subsoil contains more clay than that of the Hand soil. The moderately well drained Prosper soils are in swales.

Organic matter content is moderate and fertility medium in the Hand soil. Permeability is moderate. Available water capacity is high. Runoff is slow. The shrink-swell potential is moderate.

Most of the acreage is cropland. This soil is well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Measures that conserve moisture are the main management needs. Leaving crop residue on the surface is an example. The soil is well suited to irrigation.

This soil is well suited to range. The native vegetation dominantly is needlegrasses and western wheatgrass. Overused areas are dominated by Kentucky bluegrass, blue grama, and weeds.

This soil is well suited to windbreaks and environmental plantings. Except for those species that require an abundant supply of moisture, all climatically suited trees and shrubs grow well.

This soil is only fairly well suited to most kinds of building site development because the shrink-swell potential is a limitation. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings, however, help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage.

Because of the restricted permeability, this soil is only fairly well suited to septic tank absorption fields. Enlarging the absorption area, however, helps to overcome the slow absorption of liquid waste.

The capability unit is IIc-2; Silty range site.

Hb—Haynie silt loam. This deep, well drained, nearly level soil is on the flood plain along the Missouri River. Fort Randall Dam holds back the potential floodwater in the river. Areas are 10 to 80 acres in size and are long and narrow or irregularly shaped.

Typically, the surface layer is grayish brown, calcareous silt loam about 9 inches thick. The underlying material to a depth of 60 inches is light brownish gray and pale brown, calcareous, stratified silt loam and very fine sandy loam. In places the surface layer is not so dark. In some areas the content of clay is higher throughout the soil.

Included with this soil in mapping are small areas of Munjor soils in the slightly higher positions on the flood plain. These soils make up less than 10 percent of any one mapped area. They contain more sand than the Haynie soil.

Organic matter content is moderate and fertility medium in the Haynie soil. Permeability is moderate. Available water capacity is very high. Runoff is slow.

Most of the acreage is cropland. This soil is well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Measures that conserve moisture are the main management needs. Leaving crop residue on the surface is an example. The soil is well suited to irrigation.

This soil is well suited to range, but very few areas support native grasses. The native vegetation dominantly is bluestems and western wheatgrass. A few scattered trees are in some areas. Overused areas are dominated by western wheatgrass and needleandthread. After continued overuse, blue grama, Kentucky bluegrass, and weeds dominate the site.

This soil is well suited to windbreaks and environmental plantings. All climatically suited trees and shrubs grow well, except for those that require an abundant moisture supply.

This soil is well suited to most kinds of building site development and to septic tank absorption fields.

The capability unit is IIc-1; Silty range site.

Hc—Haynie Variant silt loam. This deep, well drained, nearly level soil is on the flood plain along the Missouri River. Fort Randall Dam holds back the potential floodwater in the river. Areas are 10 to 100 acres in size and are long and narrow.

Typically, the surface layer is brown, calcareous silt loam about 7 inches thick. The underlying material to a depth of 60 inches is light brownish gray, calcareous, stratified silt loam and very fine sandy loam. In places the surface layer is darker.

Included with this soil in mapping are small areas of Aowa soils. These soils make up less than 10 percent of any one mapped area. They contain more clay than the Haynie Variant soil. They are in plane areas.

Organic matter content is very low and fertility low in the Haynie Variant soil. Permeability is moderate. Available water capacity is high. Runoff is slow.

Most of the acreage is cropland. This soil is well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Measures that control wind erosion, conserve moisture, increase the content of organic matter, and improve fertility are the main management needs. Examples are minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system. The soil is well suited to irrigation.

This soil is well suited to range, but very few areas support native grasses. The native vegetation dominantly is western wheatgrass, needlegrass, and bluestems. Overused areas are dominated by blue grama, Kentucky bluegrass, and weeds.

This soil is well suited to windbreaks and environmental plantings. Except for those species that require an abundant moisture supply, all climatically suited trees and shrubs grow well.

This soil is well suited to building site development and septic tank absorption fields.

The capability unit is IIe-1; Silty range site.

HeB—Henkin loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on uplands. Areas are 30 to 60 acres in size and are irregular in shape. Slopes generally are smooth.

Typically, the surface layer is very dark grayish brown loam about 9 inches thick. The subsoil is dark grayish brown and grayish brown, very friable fine sandy loam about 19 inches thick. It is calcareous in the lower part. The upper part of the underlying material is grayish brown, calcareous fine sandy loam. The lower part to a depth of 60 inches is brown, calcareous loamy fine sand. In places the soil is dark to a depth of more than 20 inches.

Included with this soil in mapping are scattered small areas of Hand soils. These soils make up less than 10 percent of any one mapped area. Their subsoil contains less sand than that of the Henkin soil.

Organic matter content is moderate and fertility medium in the Henkin soil. Permeability is moderately rapid. Available water capacity is moderate. Runoff is medium.

Most of the acreage is cropland. This soil is well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Measures that control erosion are the main management needs. Leaving crop residue on the surface is an example. The soil is well suited to irrigation.

This soil is well suited to range. The native vegetation dominantly is bluestems, prairie sandreed, and needlegrasses. Overused areas are dominated by western wheatgrass and needleandthread. After continued overuse, blue grama, Kentucky bluegrass, and weeds dominate the site.

This soil is well suited to windbreaks and environmental plantings. Except for those species that require an abundant moisture supply, all climatically suited trees and shrubs grow well.

This soil is well suited to most kinds of building site development and to septic tank absorption fields.

The capability unit is IIIe-7; Sandy range site.

HgA—Highmore silt loam, 0 to 2 percent slopes. This deep, well drained, nearly level soil is on uplands. Areas are 15 to 500 acres in size and are irregular in shape. Slopes generally are smooth.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is dark grayish brown, dark brown, and light yellowish brown, firm silty clay loam about 19 inches thick. It is calcareous in the lower part. The underlying material to a depth of 60 inches is light yellowish brown, calcareous silty clay loam and clay loam. In places clay loam glacial till is 20 to 40 inches from the surface.

Included with this soil in mapping are small areas of Ethan, Onita, Tetonka, and Walke soils. These soils make up less than 15 percent of any one mapped area. Ethan soils are calcareous within a depth of 9 inches. They are on slight rises. The moderately well drained Onita soils are in swales. The poorly drained Tetonka soils are in depressions. Walke soils have a sodium affected subsoil. They are in slight depressions.

Organic matter content is moderate and fertility medium in the Highmore soil. Permeability is moderate in the subsoil and moderately slow in the underlying material. Available water capacity is high. Runoff is slow. The shrink-swell potential is moderate.

Most of the acreage is cropped. This soil is well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Measures that conserve moisture are the main management needs. Leaving crop residue on the surface is an example. The soil is well suited to irrigation.

This soil is well suited to range. The native vegetation dominantly is western wheatgrass, needlegrasses, and bluestems. Overused areas are dominated by western wheatgrass and blue grama. After continued overuse, Kentucky bluegrass, blue grama, and weeds dominate the site.

This soil is well suited to windbreaks and environmental plantings. Except for those species that require abundant moisture supply, all climatically suited trees and shrubs grow well.

This soil is only fairly well suited to building site development because the shrink-swell potential is a limitation. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings, however, help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage.

This soil is only fairly well suited to septic tank absorption fields because of the restricted permeability. Enlarging the absorption area, however, helps to overcome the slow absorption of liquid waste.

The capability unit is IIc-2; Silty range site.

HhB—Highmore-Eakin silt loams, 2 to 6 percent slopes. These deep, well drained, undulating soils are on uplands. The Highmore soil is on smooth side slopes and the broader ridgetops. The Eakin soil is on the higher convex slopes. Most slopes are long and smooth, but some are short and complex. Areas are 15 to 500 acres in size and are irregular in shape. They are 45 to 55 percent Highmore soil and 25 to 35 percent Eakin soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Highmore soil is dark grayish brown silt loam about 7 inches thick. The subsoil is dark grayish brown, dark brown, and light yellowish brown, firm silty clay loam about 19 inches thick. In the lower part it is calcareous and has accumulations of lime that extend into the underlying material. The underlying material to a depth of 60 inches is light yellowish brown, calcareous silty clay loam and clay loam.

Typically, the surface layer of the Eakin soil is dark grayish brown silt loam about 7 inches thick. The subsoil is grayish brown and light olive brown, friable silty clay loam about 22 inches thick. In the lower part it is calcareous and has accumulations of carbonate that extend into the underlying material. The underlying material to a depth of 60 inches is pale olive, calcareous clay loam. In places glacial till is within a depth of 20 inches.

Included with these soils in mapping are small areas of Clarno, Ethan, Onita, Tetonka, and Walke soils. These included soils make up less than 25 percent of any one mapped area. The loamy Clarno soils are in positions on the landscape similar to those of the Eakin soil. Ethan soils have lime near the surface. They are on the higher convex parts of the landscape. The moderately well drained Onita soils are in swales. They are dark to a depth of more than 20 inches. The poorly drained Tetonka soils are in depressions. Walke soils have a sodium affected subsoil. They are in slight depressions.

Organic matter content is moderate and fertility medium in the Highmore and Eakin soils. Permeability is

moderate in the subsoil and moderately slow in the underlying material. Available water capacity is high. Runoff is medium. The shrink-swell potential is moderate.

Most of the acreage is cropland. These soils are well suited to cultivated crops and to hay and tame pasture plants, such as alfalfa, green needlegrass, intermediate wheatgrass, and smooth bromegrass. Measures that control erosion and conserve moisture are the main management needs. Examples are minimizing tillage and leaving crop residue on the surface. Contour farming, grassed waterways, and terraces also can help to control erosion, but the slopes in some areas are too short or too irregular for contouring and terracing.

These soils are well suited to windbreaks and environmental plantings. All climatically suited trees and shrubs grow well, except for those that require an abundant moisture supply.

These soils are well suited to range. The native vegetation dominantly is needlegrass and western wheatgrass. Overused areas are dominanted by blue grama and Kentucky bluegrass.

These soils are fairly well suited to most kinds of building site development and sanitary facilities. The shrink-swell potential is a limitation on building sites, and the restricted permeability is a limitation in septic tank absorption fields. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage. Enlarging the absorption area in septic tank absorption fields helps to overcome the slow absorption of liquid waste.

The capability unit is IIe-1; Silty range site.

HIA—Highmore-Walke silt loams, 0 to 2 percent slopes. These deep, nearly level soils are in areas on uplands where smooth slopes and poorly defined drainageways are typical. The well drained Highmore soil is on the higher parts of the landscape. The moderately well drained Walke soil is on the plane or slightly concave parts. Areas are 15 to more than 1,000 acres in size and are irregular in shape. They are 55 to 65 percent Highmore soil and 20 to 30 percent Walke soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Highmore soil is dark grayish brown silt loam about 7 inches thick. The subsoil is dark grayish brown, dark brown, and light yellowish brown, firm silty clay loam about 19 inches thick. In the lower part it is calcareous and has accumulations of lime that extend into the underlying material. The underlying material to a depth of 60 inches is light yellowish brown, calcareous silty clay loam. In places loamy glacial till is 20 to 40 inches from the surface.

Typically, the surface layer of the Walke soil is dark gray silt loam about 3 inches thick. The subsurface layer is dark grayish brown silt loam about 5 inches thick. Below this is a transitional layer of grayish brown and gray silty clay loam about 3 inches thick. The subsoil is dark grayish brown and grayish brown, firm silty clay about 19 inches thick. It is calcareous in the lower part. The underlying material to a depth of 60 inches is calcareous and has a few medium nests of gypsum. It is light yellowish brown silty clay loam over pale yellow clay loam. In some areas the subsoil has columnar structure.

Included with these soils in mapping are small areas of Ethan, Onita, and Tetonka soils. These included soils make up less than 15 percent of any one mapped area. Ethan soils have lime near the surface. They are on rises. The moderately well drained Onita soils are in swales. They are dark to a depth of more than 20 inches. The poorly drained Tetonka soils are in depressions.

Organic matter content is moderate and fertility medium in the Highmore and Walke soils. The sodium in the Walke soil adversely affects the growth of most plants. Tilth is fair in this soil. Permeability is moderate in the subsoil of the Highmore soil and moderately slow in the lower part of the underlying material. It is moderately slow or slow in the Walke soil. Available water capacity is high in the Highmore soil and moderate in the Walke soil. Runoff is slow on both soils. The shrink-swell potential is moderate in the Highmore soil. It is high in the subsoil of the Walke soil and moderate in the underlying material.

Most of the acreage is cropland. These soils are fairly well suited to cultivated crops. They are well suited to hay and tame pasture plants, such as alfalfa, intermediate wheatgrass, and smooth bromegrass. Crop growth is uneven because it is restricted on the Walke soil. The main concerns in managing cultivated areas are conserving moisture and improving tilth. Leaving crop residue on the surface and including grasses and legumes in the cropping system conserve moisture, improve tilth and fertility, and increase the content of organic matter.

These soils are well suited to range. The native vegetation dominantly is green needlegrass and western wheatgrass. Overused areas are dominated by blue grama and Kentucky bluegrass.

These soils are fairly well suited to windbreaks and environmental plantings. All climatically suited trees and shrubs grow fairly well, but the growth is slightly restricted on the Walke soil.

Because of the high shrink-swell potential, the Walke soil provides an unstable base for buildings. The Highmore soil is better suited to building site development, but its moderate shrink-swell potential is a limitation. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage.

Because of the restricted permeability, the Highmore soil is only fairly well suited to septic tank absorption

fields. Enlarging the absorption area, however, helps to overcome the slow absorption of liquid waste. The fields do not function properly in the Walke soil because of the restricted permeability.

The Highmore soil is in capability unit IIc-2, Silty range site; the Walke soil is in capability unit IIIs-1, Clayey range site.

HmB—Homme-Ethan-Onita complex, 1 to 6 percent slopes. These deep, undulating soils are in areas on uplands where slopes generally are short and complex. The well drained Homme soil is on smooth side slopes. The well drained Ethan soil is on the upper convex side slopes and on narrow ridges (fig. 8). The moderately well drained Onita soil is on foot slopes and in narrow swales. It is occasionally flooded for brief periods in the spring. Areas are 10 to 350 acres in size and are irregular in shape. They are 40 to 45 percent Homme soil, 25 to 35 percent Ethan soil, and 15 to 25 percent Onita soil. The three soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Homme soil is very dark grayish brown silty clay loam about 8 inches thick. The subsoil is dark brown, brown, and pale brown, friable and firm silty clay loam about 30 inches thick. It is calcareous in the lower part. The underlying material to a depth of 60 inches is light yellowish brown, calcareous clay loam.

Typically, the surface layer of the Ethan soil is dark grayish brown, calcareous loam about 6 inches thick. The subsoil is dark grayish brown and light gray, friable, calcareous loam about 15 inches thick. The underlying material to a depth of 60 inches is light gray, calcareous clay loam.

Typically, the surface layer of the Onita soil is dark gray silty clay loam about 10 inches thick. The subsoil is dark grayish brown and grayish brown, friable and firm silty clay loam about 25 inches thick. It is calcareous in the lower part. The upper part of the underlying material is yellowish brown, calcareous silty clay loam. The lower part to a depth of 60 inches is light brownish gray, calcareous clay loam.

Included with these soils in mapping are small areas of Chancellor, Davison, and Tetonka soils. These included soils make up less than 15 percent of any one mapped area. The poorly drained Chancellor soils are in swales. The moderately well drained Davison soils are on foot slopes and on slight rises in swales. They are calcareous

Figure 8.—An area of Homme-Ethan-Onita complex, 1 to 6 percent slopes. The Ethan soil is in the light colored areas.

throughout. The poorly drained Tetonka soils are in depressions.

Organic matter content is moderate in the Homme soil, low in the Ethan soil, and high in the Onita soil. Fertility is medium in the Homme soil, low in the Ethan soil, and high in the Onita soil. Permeability is moderately slow in the Homme and Onita soils. It is moderate in the upper part of the Ethan soil and moderately slow in the underlying material. Available water capacity is high in all three soils. The Onita soil has a water table at a depth of 2.5 to 6.0 feet during wet periods. Runoff is medium on the Homme and Ethan soils and slow on the Onita soil. The shrink-swell potential is high in the upper part of the Homme and Onita soils and moderate in the lower part. It is moderate in the Ethan soil.

Most of the acreage is cropland. These soils are well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. The main concerns of management are controlling erosion and conserving moisture. Improving fertility also is a concern because the high content of lime in the Ethan soil adversely affects the availability of plant nutrients. In some years planting is delayed because of the wetness of the Onita soil. Leaving crop residue on the surface and including grasses and legumes in the cropping system help to control erosion, conserve moisture, and improve fertility. Contour farming, grassed waterways, and terraces also can help to control erosion, but slopes generally are too short or too irregular for contouring and terracing.

These soils are well suited to range. The natural vegetation dominantly is western wheatgrass, bluestems, and green needlegrass. Overused areas are dominated by western wheatgrass and grama grasses. After continued overuse, Kentucky bluegrass and weeds dominate the site.

The Homme and Onita soils are well suited to windbreaks and environmental plantings, but the Ethan soil is poorly suited. All climatically suited trees and shrubs grow well on the Homme and Onita soils. Windbreaks can be established on the Ethan soil, but optimum survival, growth, and vigor are unlikely.

The Homme and Ethan soils are fairly well suited to most kinds of building site development and sanitary facilities. The Onita soil is unsuited, however, because it is occasionally flooded. The shrink-swell potential of the Homme and Ethan soils is a limitation on building sites, and the restricted permeability is a limitation in septic tank absorption fields. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage. Enlarging the absorption area in septic tank absorption fields helps to overcome the slow absorption of liquid waste.

The Homme soil is in capability unit IIe-1, Silty range site; the Ethan soil is in capability unit IIIe-12, Silty range site; the Onita soil is in capability unit IIc-3, Overflow range site.

HoA—Homme-Onita silty clay loams, 0 to 2 percent slopes. These deep, nearly level soils are on uplands. The well drained Homme soil is on slight rises. The moderately well drained Onita soil is on flats and in swales. It is occasionally flooded for brief periods in the spring. Areas are 5 to more than 200 acres in size and are irregular in shape. They are 50 to 60 percent Homme soil and 25 to 35 percent Onita soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Homme soil is very dark grayish brown silty clay loam about 8 inches thick. The subsoil is dark brown, brown, and pale brown, friable and firm silty clay loam about 30 inches thick. In the lower part it is calcareous and has accumulations of carbonate that extend into the underlying material. The underlying material to a depth of 60 inches is light yellowish brown, calcareous clay loam.

Typically, the surface layer of the Onita soil is dark gray silty clay loam about 10 inches thick. The subsoil is dark grayish brown and grayish brown, friable and firm silty clay loam about 25 inches thick. It is calcareous in the lower part. The upper part of the underlying material is yellowish brown, calcareous silty clay loam. The lower part to a depth of 60 inches is light brownish gray, calcareous clay loam.

Included with these soils in mapping are small areas of Chancellor, Davison, Tetonka, and Walke soils. These included soils make up less than 10 percent of any one mapped area. The poorly drained Chancellor soils are in swales. The moderately well drained Davison soils are in an intermediate position on the landscape between the Tetonka and the Homme soils. They are calcareous throughout. The poorly drained Tetonka soils are in depressions. Walke soils have a sodium affected subsoil. They are on small flats.

Organic matter content is moderate in the Homme soil and high in the Onita soil. Fertility is medium in the Homme soil and high in the Onita soil. Permeability is moderately slow in both soils. Available water capacity is high. The Onita soil has a seasonal high water table at a depth of 2.5 to 6.0 feet during wet periods. Runoff is slow on both soils. The shrink-swell potential is high in the subsoil of the Homme soil and moderate in the underlying material. It is high in the Onita soil.

Most of the acreage is cropland. These soils are well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Measures that conserve moisture are the main management needs. Examples are leaving crop residue on the surface and including grasses and legumes in the cropping system.

These soils are well suited to range. The native vegetation dominantly is bluestems and green

needlegrass. Overused areas are dominated by western wheatgrass and Kentucky bluegrass. After continued overuse, Kentucky bluegrass and weeds dominate the site.

These soils are well suited to windbreaks and environmental plantings. All climatically suited trees and shrubs grow well. Those that require an abundant moisture supply grow especially well on the Onita soil.

The Homme soil is fairly well suited to most kinds of building site development and sanitary facilities. The Onita soil generally is unsuited, however, because it is subject to flooding. The shrink-swell potential of the Homme soil is a limitation on building sites, and the restricted permeability is a limitation in septic tank absorption fields. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage. Enlarging the absorption area in septic tank absorption fields helps to overcome the slow absorption of liquid waste.

The Homme soil is in capability unit IIc-2, Silty range site; the Onita soil is in capability unit IIc-3, Overflow range site.

HoB—Homme-Onita silty clay loams, 1 to 6 percent slopes. These deep, undulating soils are on uplands. The well drained Homme soil is on the upper slopes. The moderately well drained Onita soil is in swales. It is occasionally flooded for brief periods in the spring. Areas are 5 to 300 acres in size and are irregular in shape. They are 55 to 65 percent Homme soil and 20 to 30 percent Onita soil. The two soils occur as areas so intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Homme soil is very dark grayish brown silty clay loam about 8 inches thick. The subsoil is dark brown, brown, and pale brown, friable and firm silty clay loam about 30 inches thick. It is calcareous in the lower part. The underlying material to a depth of 60 inches is light yellowish brown, calcareous clay loam.

Typically, the surface layer of the Onita soil is dark gray silty clay loam about 10 inches thick. The subsoil is dark grayish brown and grayish brown, friable and firm silty clay loam about 25 inches thick. It is calcareous in the lower part. The upper part of the underlying material is yellowish brown, calcareous silty clay loam. The lower part to a depth of 60 inches is light brownish gray, calcareous clay loam.

Included with these soils in mapping are small areas of Chancellor, Davison, Ethan, Tetonka, and Walke soils. These included soils make up less than 15 percent of any one mapped area. The poorly drained Chancellor soils are in swales. The moderately well drained Davison soils are on slight rises in swales. They are calcareous throughout. Ethan soils have lime near the surface and formed in glacial till. They are on ridges and knolls. The poorly drained Tetonka soils are in depressions. Walke soils have a sodium affected subsoil. They are on small flats.

Organic matter content is moderate in the Homme soil and high in the Onita soil. Fertility is medium in the Homme soil and high in the Onita soil. Permeability is moderately slow in both soils. Available water capacity is high. The Onita soil has a seasonal high water table at a depth of 2.5 to 6.0 feet during wet periods. Runoff is slow on both soils. The shrink-swell potential is high in the subsoil of the Homme soil and moderate in the underlying material. It is high in the Onita soil.

Most of the acreage is cropland. These soils are well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Measures that control erosion and conserve moisture are the main management needs. Examples are leaving crop residue on the surface and including grasses and legumes in the cropping system. Farming is delayed in some years because the Onita soil receives runoff from the adjacent uplands.

These soils are well suited to range. The native vegetation dominantly is bluestems and green needlegrass. Overused areas are dominated by western wheatgrass and Kentucky bluegrass. After continued overuse, Kentucky bluegrass and weeds dominate the site.

These soils are well suited to windbreaks and environmental plantings. All climatically suited trees and shrubs grow well. Those that require an abundant moisture supply grow especially well on the Onita soil.

The Homme soil is fairly well suited to most kinds of building site development and sanitary facilities, but the Onita soil generally is unsuited because it is subject to flooding. The shrink-swell potential of the Homme soil is a limitation on building sites, and the restricted permeability is a limitation in septic tank absorption fields. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage. Enlarging the absorption area in septic tank absorption fields helps to overcome the slow absorption of liquid waste.

The Homme soil is in capability unit IIe-1, Silty range site; the Onita soil is in capability unit IIc-3, Overflow range site.

HuA—Houdek loam, 0 to 2 percent slopes. This deep, well drained, nearly level soil is on uplands. Areas are 30 to more than 100 acres in size and are irregular in shape. Slopes generally are smooth.

Typically, the surface layer is very dark grayish brown loam about 6 inches thick. The subsoil is dark grayish brown and light yellowish brown, firm clay loam about 18 inches thick. In the lower part it is calcareous and has

soft accumulations of carbonate. The underlying material to a depth of 60 inches is light yellowish brown, calcareous clay loam and loam. It has soft accumulations of carbonate in the upper part.

Included with this soil in mapping are small areas of Eakin, Prosper, and Tetonka soils. These soils make up less than 15 percent of any one mapped area. The silty Eakin soils occur in a random pattern throughout the mapped areas. The moderately well drained Prosper soils are in swales. The poorly drained Tetonka soils are in depressions.

Organic matter content is moderate and fertility medium in the Houdek soil. Permeability is moderate in the subsoil and moderately slow in the underlying material. Available water capacity is high. Runoff is slow. The shrink-swell potential is moderate.

Most of the acreage is cropland. This soil is well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Measures that conserve moisture are the main management needs. Leaving crop residue on the surface is an example.

This soil is well suited to range. The native vegetation dominantly is needlegrasses, western wheatgrass, and bluestems. Overused areas are dominated by western wheatgrass and needleandthread. After continued overuse, Kentucky bluegrass, blue grama, and weeds dominate the site.

This soil is well suited to windbreaks and environmental plantings. All climatically suited trees and shrubs grow well, except for those that require an abundant moisture supply.

This soil is only fairly well suited to most kinds of building site development and sanitary facilities. The shrink-swell potential is a limitation on building sites, and the restricted permeability is a limitation in septic tank absorption fields. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage. Enlarging the absorption area in septic tank absorption fields helps to overcome the slow absorption of liquid waste.

The capability unit is IIc-2; Silty range site.

HuB—Houdek loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on uplands. Areas are 10 to 100 acres in size and are irregular in shape. Slopes generally are smooth.

Typically, the surface layer is very dark grayish brown loam about 6 inches thick. The subsoil is dark grayish brown and light yellowish brown, firm clay loam about 18 inches thick. In the lower part it is calcareous and has soft accumulations of carbonate. The underlying material to a depth of 60 inches is light yellowish brown, calcareous clay loam and loam. It has soft accumulations of carbonate in the upper part.

Included with this soil in mapping are small areas of Eakin, Prosper, and Tetonka soils. These soils make up less than 15 percent of any one mapped area. The silty Eakin soils occur in a random pattern throughout the mapped areas. The moderately well drained Prosper soils are in swales. The poorly drained Tetonka soils are in depressions.

Organic matter content is moderate and fertility medium in the Houdek soil. Permeability is moderate in the subsoil and moderately slow in the underlying material. Available water capacity is high. Runoff is medium. The shrink-swell potential is moderate.

Most of the acreage is cropland. This soil is well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Measures that control erosion and conserve moisture are the main management needs. Examples are leaving crop residue on the surface and including grasses and legumes in the cropping system.

This soil is well suited to range. The native vegetation dominantly is needlegrasses, western wheatgrass, and bluestems. Overused areas are dominated by western wheatgrass and needleandthread. After continued overuse, Kentucky bluegrass, blue grama, and weeds dominate the site.

This soil is well suited to windbreaks and environmental plantings. All climatically suited trees and shrubs grow well, except for those that require an abundant moisture supply.

This soil is only fairly well suited to most kinds of building site development and sanitary facilities. The shrink-swell potential is a limitation on building sites, and the restricted permeability is a limitation in septic tank absorption fields. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage. Enlarging the absorption area in septic tank absorption fields helps to overcome the slow absorption of liquid waste.

The capability unit is IIe-2; Silty range site.

Hv—Hoven silt loam. This deep, poorly drained, level soil is in depressions in the uplands. It is ponded during periods of snowmelt and heavy rainfall. Areas are 3 to 100 acres in size and generally are circular.

Typically, the surface layer is grayish brown silt loam about 3 inches thick. The subsoil is dark gray and gray, very firm and firm silty clay about 26 inches thick. In the lower part it has nests of gypsum crystals that extend into the underlying material. The underlying material to a depth of 60 inches is light brownish gray, calcareous clay loam. It has accumulations of carbonate. In places the surface layer is thicker.

Included with this soil in mapping are small areas of Onita and Tetonka soils. These soils make up less than

10 percent of any one mapped area. The moderately well drained Onita soils are in swales. The Tetonka soils do not have a sodium affected subsoil. They are in positions on the landscape similar to those of the Hoven soil.

Organic matter content is moderate and fertility medium in the Hoven soil. The content of sodium adversely affects the growth of most plants. Permeability is very slow. Available water capacity is moderate. A seasonal water table is within a depth of 1.5 feet part of the year. As much as 1.0 foot of water ponds on the surface during some wet periods. Runoff is ponded. The shrink-swell potential is high.

Most areas support native grasses. This soil is fairly well suited to range. The native vegetation dominantly is western wheatgrass. Overused areas are dominated by saltgrass and weeds. Many areas are potential sites for excavated ponds.

This soil generally is unsuited to cultivated crops and to windbreaks and environmental plantings. It is only fairly well suited to tame pasture and hay because the ponding and the sodium salts severely limit the number of suitable species. Garrison creeping foxtail and western wheatgrass are suitable.

This soil generally is unsuitable as a site for buildings and most sanitary facilities because of the ponding.

The capability unit is VIs-1; Closed Depression range site.

InB—Inavale fine sand, 2 to 6 percent slopes. This deep, somewhat excessively drained, undulating soil is on the flood plain along the Missouri River and on islands in the river. It is riverwashed sand that has been reworked by wind and is now stabilized. Fort Randall Dam holds back the potential floodwater in the river. Areas are 15 to 140 acres in size and are long and narrow. Slopes generally are short and convex.

Typically, the surface layer is brown fine sand about 2 inches thick. The underlying material to a depth of 60 inches is pale brown and light brownish gray, calcareous, stratified fine sand.

Included with this soil in mapping are small areas of soils on sand dunes and of Inavale Variant soils. These soils make up less than 20 percent of any one mapped area. The sand dunes support no vegetation. They are convex mounds and ridges intermingled with areas of the Inavale soil. The poorly drained Inavale Variant soils are in small depressions.

Organic matter content is very low and fertility low in the Inavale soil. Permeability is rapid. Available water capacity is low. Runoff is slow.

All areas support native vegetation and are used primarily as range and wildlife habitat. They provide excellent shelter for wintering livestock. The native vegetation dominantly is cottonwood, green ash, cedar, and shrubs and an understory of bluestems, prairie sandreed, and needlegrasses. Sweetclover grows in many areas.

This soil generally is unsuited to cultivated crops and to tame pasture and hay. It is poorly suited to windbreaks and environmental plantings. Only evergreens and shrubs can be successfully established.

This soil is well suited to most kinds of building site development, but the sides of shallow excavations tend to cave in unless they are shored. Revegetating construction sites is difficult. Applying surface mulch after seeding helps to control wind erosion. The soil readily absorbs but does not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity may result in the pollution of shallow ground water.

The capability unit is VIe-7; Sands range site.

IvA—Inavale loamy fine sand, 0 to 6 percent slopes. This deep, somewhat excessively drained, nearly level to undulating soil is on the flood plain along the Missouri River. Fort Randall Dam holds back the potential floodwater in the river. Areas are 10 to 120 acres in size and are long and narrow. Most of the slopes are hummocky.

Typically, the surface layer is grayish brown loamy fine sand about 4 inches thick. Below this is a transitional layer of pale brown loamy fine sand about 6 inches thick. The underlying material to a depth of 60 inches is light gray and light brownish gray, calcareous, stratified fine sand and loamy fine sand.

Included with this soil in mapping are small areas of the well drained Munjor soils. These soils make up less than 10 percent of any one mapped area. They contain less sand than the Inavale soil. Also, they are farther from the river.

Organic matter content is very low and fertility low in the Inavale soil. Permeability is rapid. Available water capacity is low. Runoff is slow.

Most areas support native vegetation and are used for grazing and wildlife habitat. They provide excellent shelter for wintering livestock. This soil is fairly well suited to range. The native vegetation dominantly is cottonwood, ash, and willow and an understory of bluestems and prairie sandreed. In most places the trees and shrubs shade out some of the grasses. Overgrazed areas are dominated by needleandthread, western wheatgrass, and sideoats grama. After continued overuse, sand dropseed and weeds dominate the site. Also, blowouts are common.

This soil is poorly suited to cultivated crops. It is well suited, however, to tame pasture and hay. Examples of suitable pasture plants are alfalfa and smooth bromegrass. Measures that control wind erosion are the main management needs. Examples are leaving crop residue on the surface and including grasses and legumes in the cropping system.

This soil is poorly suited to windbreaks and environmental plantings. Only evergreens and shrubs can be successfully established.

This soil is well suited to building site development, but the sides of shallow excavations tend to cave in unless

they are shored. Revegetating construction sites is difficult. Applying surface mulch after seeding helps to control wind erosion. The soil readily absorbs the effluent from septic tank absorption fields, but it does not adequately filter the effluent. The poor filtering capacity may result in the pollution of ground water.

The capability unit is IVe-7; Sands range site.

Ix—Inavale Variant loamy fine sand. This deep, poorly drained soil is in marshy areas adjacent to the Missouri River and on islands in the river. It is frequently flooded during periods of high streamflow. Areas are 15 to 125 acres in size and are oblong or long and narrow.

Typically, the surface layer is light brownish gray loamy fine sand about 7 inches thick. Below this is a transitional layer of light brownish gray loamy fine sand about 11 inches thick. The underlying material is light gray, stratified loamy fine sand and fine sand. In places a thin layer of silty sediment is at the surface.

Included with this soil in mapping are small areas of the somewhat excessively drained Inavale soils on small mounds. These soils make up less than 10 percent of any one mapped area.

Organic matter content is very low and fertility low in the Inavale Variant soil. Permeability is rapid. Available water capacity is low. A seasonal high water table is at a depth of 0.5 to 1.5 feet most of the year. Runoff is very slow.

All of the acreage supports native vegetation and is used as habitat for wildlife. The native vegetation dominantly is cattails and rushes and a few willows and cottonwoods.

This soil is too wet or too frequently flooded for cultivated crops, tame pasture and hay, range, windbreaks and environmental plantings, buildings, and sanitary facilities.

The capability unit is VIIIw-1; no range site is assigned.

LaA—Lane silty clay loam, 0 to 2 percent slopes. This deep, well drained, nearly level soil is on foot slopes. Areas are 40 to 300 acres in size and are irregular in shape. Slopes are smooth and slightly concave.

Typically, the surface layer is dark gray silty clay loam about 8 inches thick. The subsoil is about 28 inches of dark grayish brown and grayish brown, firm silty clay loam and silty clay. It is calcareous in the lower part. The underlying material to a depth of 60 inches is grayish brown, calcareous silty clay and silty clay loam. In places the depth to free carbonates is more than 22 inches.

Included with this soil in mapping are small areas of Eakin, Highmore, and Promise soils. These soils make up less than 10 percent of any one mapped area. Eakin and Highmore soils are not dark below a depth of 20 inches. They are on uplands. Promise soils are in positions on the landscape similar to those of the Lane soil. Their subsoil contains more clay than that of the Lane soil.

Organic matter content and fertility are high in the Lane soil. Tilth is fair. Permeability is moderately slow. Available water capacity is high. Runoff is slow. The shrink-swell potential is high.

Most of the acreage is cropland. This soil is well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Conserving moisture, increasing the rate of water intake, and improving tilth are the main concerns in managing cultivated areas. Tilling when the soil is wet causes compaction of the subsoil. Leaving crop residue on the surface conserves moisture and improves fertility and tilth. Chiseling or subsoiling increases the water intake rate.

This soil is well suited to range. The native vegetation dominantly is western wheatgrass and green needlegrass. Overused areas are dominated by western wheatgrass and blue grama. After continued overuse, Kentucky bluegrass, blue grama, and weeds occupy the site.

This soil is well suited to windbreaks and environmental plantings. Except for those species that can grow well only if the supply of moisture is high, all climatically suited trees and shrubs grow well.

Because of the high shrink-swell potential, this soil is poorly suited to building site development. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings, however, help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage.

Because of the restricted permeability, this soil is poorly suited to septic tank absorption fields. Enlarging the absorption area, however, helps to overcome the slow absorption of liquid waste.

The capability unit is IIs-1; Clayey range site.

LaB—Lane silty clay loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on foot slopes. Areas are 10 to 100 acres in size and are irregular in shape. Most of the slopes are smooth.

Typically, the surface layer is dark gray silty clay loam about 8 inches thick. The subsoil is about 28 inches of dark grayish brown and grayish brown, firm silty clay loam and silty clay. It is calcareous in the lower part. The underlying material to a depth of 60 inches is grayish brown, calcareous silty clay and silty clay loam. In places the depth to free carbonates is more than 22 inches.

Included with this soil in mapping are small areas of Eakin, Highmore, and Promise soils. These soils make up less than 10 percent of any one mapped area. Eakin and Highmore soils are not dark below a depth of 20 inches. They are on slight rises. Promise soils are in positions on the landscape similar to those of the Lane soil. Their subsoil contains more clay than that of the Lane soil.

Organic matter content and fertility are high in the Lane soil. Tilth is fair. Permeability is moderately slow.

Available water capacity is high. Runoff is medium. The shrink-swell potential is high.

Most of the acreage is cropland. This soil is fairly well suited to cultivated crops. It is well suited to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Controlling erosion and improving tilth are the main concerns of management. Tilling when the soil is wet causes compaction of the subsoil. Including grasses and legumes in the cropping system and leaving crop residue on the surface conserve moisture and improve tilth. Chiseling or subsoiling increases the water intake rate. Restricting use during wet periods helps to prevent compaction.

This soil is well suited to range. The native vegetation dominantly is western wheatgrass and green needlegrass. Overused areas are dominated by western wheatgrass and blue grama. After continued overuse, Kentucky bluegrass, blue grama, and weeds dominate the site.

This soil is well suited to windbreaks and environmental plantings. Except for those species that can grow well only if the supply of moisture is high, all climatically suited trees and shrubs grow well.

Because of the high shrink-swell potential, this soil is poorly suited to building site development. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings, however, help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage.

Because of the restricted permeability, this soil is poorly suited to septic tank absorption fields. Enlarging the absorption area, however, helps to overcome the slow absorption of liquid waste.

The capability unit is IIIe-3; Clayey range site.

LoA—Lowry silt loam, 0 to 2 percent slopes. This deep, well drained, nearly level soil is on uplands adjacent to the breaks along the Missouri River. Areas are 30 to 400 acres in size and are irregular in shape. Most of the slopes are smooth.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is dark grayish brown and grayish brown, very friable silt loam about 15 inches thick. It is calcareous in the lower part. The underlying material to a depth of 60 inches is brown, pale brown, and dark grayish brown, calcareous silt loam. It has accumulations of carbonate in the upper part.

Included with this soil in mapping are small areas of Agar and Mobridge soils. These soils make up less than 15 percent of any one mapped area. Agar soils contain more clay in the subsoil than the Lowry soil. They are in positions on the landscape similar to those of the Lowry soil. The moderately well drained Mobridge soils are in swales.

Organic matter content is moderate and fertility medium in the Lowry soil. Permeability is moderate. Available water capacity is high. Runoff is slow.

Most of the acreage is cropland. This soil is well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Measures that control wind erosion and conserve moisture are the main management needs. Examples are including legumes and grasses in the cropping system and leaving crop residue on the surface. The soil is well suited to irrigation.

This soil is well suited to range. The native vegetation dominantly is western wheatgrass, green needlegrass, and bluestems. Overused areas are dominated by western wheatgrass and needleandthread. After continued overuse, Kentucky bluegrass, blue grama, and weeds dominate the site.

This soil is well suited to windbreaks and environmental plantings. Except for those species that can grow well only if the supply of moisture is high, all climatically suited trees and shrubs grow well.

This soil is well suited to building site development and septic tank absorption fields.

The capability unit is IIe-1; Silty range site.

LoB—Lowry silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on uplands adjacent to the breaks along the Missouri River. Areas are 15 to 350 acres in size and are irregular in shape. Most of the slopes are long and smooth.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is dark grayish brown and grayish brown, very friable silt loam about 15 inches thick. It is calcareous in the lower part. The underlying material to a depth of 60 inches is brown, pale brown, and dark grayish brown, calcareous silt loam. It has accumulations of carbonate in the upper part.

Included with this soil in mapping are small areas of Agar and Mobridge soils. These soils make up less than 15 percent of any one mapped area. Agar soils contain more clay in the subsoil than the Lowry soil. They are in positions on the landscape similar to those of the Lowry soil. The moderately well drained Mobridge soils are in swales.

Organic matter content is moderate and fertility medium in the Lowry soil. Permeability is moderate. Available water capacity is high. Runoff is medium.

Most of the acreage is cropland. This soil is well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Measures that control erosion and conserve moisture are the main management needs. Examples are including grasses and legumes in the cropping system and leaving crop residue on the surface. The soil is well suited to irrigation.

This soil is well suited to range. The native vegetation dominantly is western wheatgrass, green needlegrass, and bluestems. Overused areas are dominated by western wheatgrass and needleandthread. After continued overuse, Kentucky bluegrass, blue grama, and weeds dominate the site.

This soil is well suited to windbreaks and environmental plantings. Except for those species that can grow well only if the supply of moisture is high, all climatically suited trees and shrubs grow well.

This soil is well suited to building site development and septic tank absorption fields.

The capability unit is IIe-1; Silty range site.

LoC—Lowry silt loam, 6 to 9 percent slopes. This deep, well drained, moderately sloping soil is on uplands adjacent to the breaks along the Missouri River. Areas are 20 to 250 acres in size and irregular in shape. Most of the slopes are short and smooth.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is dark grayish brown and grayish brown, very friable silt loam about 15 inches thick. It is calcareous in the lower part. The underlying material to a depth of 60 inches is brown, pale brown, and dark grayish brown, calcareous silt loam. It has accumulations of carbonate in the upper part. In places the surface layer is less than 6 inches thick.

Included with this soil in mapping are small areas of Agar and Mobridge soils. These soils make up less than 15 percent of any one mapped area. Agar soils contain more clay in the subsoil than the Lowry soil. They are in positions on the landscape similar to those of the Lowry soil. The moderately well drained Mobridge soils are in swales.

Organic matter content is moderate and fertility medium in the Lowry soil. Permeability is moderate. Available water capacity is high. Runoff is medium.

Most of the acreage is cropland. This soil is fairly well suited to cultivated crops. It is well suited to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Measures that control the erosion caused by wind and water are the main management needs. Examples are including grasses and legumes in the cropping system and leaving crop residue on the surface. Terraces and grassed waterways also are effective in controlling erosion.

This soil is well suited to range. The native vegetation dominantly is western wheatgrass, green needlegrass, and bluestems. Overused areas are dominated by western wheatgrass and needleandthread. After continued overuse, Kentucky bluegrass, blue grama, and weeds dominate the site.

This soil is well suited to windbreaks and environmental plantings. Except for those species that can grow well only if the supply of moisture is high, all climatically suited trees and shrubs grow well. Planting on the contour helps to control erosion.

This soil is well suited to most kinds of building site development and to septic tank absorption fields. Small commercial buildings should be designed to conform to the natural slope of the land. In some areas land shaping is needed.

The capability unit is IIIe-1; Silty range site.

LrF—Lowry-Gavins silt loams, 6 to 40 percent slopes. These well drained, moderately sloping to steep soils are on uplands that are dissected by deep drainageways. They are on the lower part of the breaks adjacent to the flood plain along the Missouri River. An escarpment forms the boundary between this map unit and the flood plain. The deep Lowry soil is on the less sloping divides and tableland. The shallow Gavins soil is on the steeper side slopes. Areas are 50 to 300 acres in size and are long and narrow. They are 45 to 55 percent Lowry soil and 25 to 35 percent Gavins soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Lowry soil is dark grayish brown silt loam about 7 inches thick. The subsoil is dark grayish brown and grayish brown, very friable silt loam about 15 inches thick. It is calcareous in the lower part. The underlying material to a depth of 60 inches is brown, pale brown, and dark grayish brown, calcareous silt loam. It has accumulations of carbonate in the upper part.

Typically, the surface layer of the Gavins soil is dark grayish brown silt loam about 5 inches thick. Below this is a transitional layer of brown, calcareous loam about 7 inches thick. The underlying material, to a depth of about 17 inches, is very pale brown, calcareous loam. Very pale brown and reddish yellow siltstone is at a depth of about 17 inches.

Included with these soils in mapping are small areas of Betts, Promise, and Sansarc soils. These included soils make up less than 20 percent of any one mapped area. Betts soils formed in glacial till. They are on high ridges. Promise soils formed in clayey sediments. They are along drainageways. The shallow Sansarc soils formed in residuum of clayey shale. They are higher on the landscape than the Gavins soil.

Organic matter content is moderate and fertility medium in the Lowry soil. Organic matter content and fertility are low in the Gavins soil. Permeability is moderate in both soils. Available water capacity is high in the Lowry soil and low in the Gavins soil. Runoff is rapid on both soils.

Most areas support native grasses. The Lowry soil is well suited and the Gavins soil is fairly well suited to range. The native vegetation dominantly is western wheatgrass, bluestems, sideoats grama, and needlegrasses. Overused areas are dominated by western wheatgrass and needleandthread. After continued overuse, blue grama and weeds dominate the site.

These soils generally are too steep or too shallow for cultivated crops, tame pasture and hay, windbreaks and

environmental plantings, buildings, and sanitary facilities. Some of the less sloping areas of the Lowry soil are suited to crops, windbreaks and environmental plantings, and buildings, but these areas generally are small and isolated.

The Lowry soil is in capability unit IVe-1, Silty range site; the Gavins soil is in capability unit VIIe-7, Thin Upland range site.

LsD—Lowry-Sully silt loams, 9 to 15 percent slopes. These deep, well drained, strongly sloping soils are on uplands. The Lowry soil is on the smooth, less sloping parts of the landscape. The Sully soil is on ridges and knolls. Areas are 10 to 80 acres in size and are irregular in shape. They are 50 to 60 percent Lowry soil and 25 to 35 percent Sully soil. The two soils occur as areas so intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Lowry soil is dark grayish brown silt loam about 7 inches thick. The subsoil is dark grayish brown and grayish brown, very friable silt loam about 15 inches thick. It is calcareous in the lower part. The underlying material to a depth of 60 inches is brown, pale brown, and dark grayish brown, calcareous silt loam. It has accumulations of carbonate in the upper part.

Typically, the surface layer of the Sully soil is grayish brown silt loam about 4 inches thick. The underlying material to a depth of 60 inches is pale brown, calcareous silt loam.

Included with these soils in mapping are small areas of Agar and Eakin soils on the less sloping parts of the landscape. These included soils make up less than 15 percent of any one mapped area. Their subsoil contains more clay than that of either the Lowry or Sully soil. Also, Eakin soils have glacial till 20 to 40 inches from the surface.

Organic matter content is moderate and fertility medium in the Lowry soil. Organic matter content and fertility are low in the Sully soil. Permeability is moderate in both soils. Available water capacity is high. Runoff is rapid.

Most of the acreage supports native grasses. The Lowry soil is well suited and the Sully soil fairly well suited to range. The native vegetation dominantly is western wheatgrass, bluestems, sideoats grama, and needlegrasses. Overused areas are dominated by western wheatgrass and needleandthread. After continued overuse, blue grama and weeds dominate the site.

This map unit is poorly suited to cultivated crops and to tame pasture and hay and windbreaks and environmental plantings because of the slope and the thin surface layer in the Sully soil. It is suited, however, to some pasture plants, such as alfalfa and intermediate wheatgrass. Measures that control erosion and conserve moisture are the main management needs. Examples are including grasses and legumes in the cropping system and leaving crop residue on the surface. Contour farming, terraces, and grassed waterways also help to control erosion.

The Lowry soil is well suited to windbreaks and environmental plantings, but the Sully soil is poorly suited. Windbreaks can be established on the Sully soil, but optimum growth is unlikely. Planting on the contour helps to control erosion.

These soils are only fairly well suited to most kinds of building site development and to septic tank absorption fields because of the slope. Land shaping is needed in most areas. Installing the distribution lines across the slope generally improves the efficiency of septic tank absorption fields.

The Lowry soil is in capability unit IVe-1, Silty range site; the Sully soil is in capability unit VIe-3, Thin Upland range site.

MeE—Meadin loam, 15 to 30 percent slopes. This excessively drained, moderately steep and steep soil is on uplands. Areas are 15 to 200 acres in size and irregular in shape. Slopes are short and steep.

Typically, the surface layer is dark gray loam about 4 inches thick. The subsurface layer is dark grayish brown sandy loam about 6 inches thick. Below this is a transitional layer of dark grayish brown gravelly sandy loam about 7 inches thick. The underlying material to a depth of 60 inches is very pale brown gravelly sand.

Included with this soil in mapping are small areas of Betts, Ethan, Okaton, and Sansarc soils. These soils make up less than 10 percent of any one mapped area. Betts and Ethan soils formed in glacial till. They are on the higher parts of the landscape. Okaton and Sansarc soils formed in clay weathered from shale. They are on the lower parts of the landscape.

Organic matter content and fertility are low in the Meadin soil. Permeability is very rapid. Available water capacity is low. Runoff is slow.

Most areas support native grasses. This soil is fairly well suited to range. The native vegetation dominantly is needleandthread and blue and hairy grama. Overused areas are dominated by threadleaf sedge, forbs, and weeds.

This soil generally is too steep and too droughty for cultivated crops, tame pasture and hay, and windbreaks and environmental plantings. It is too steep for building site development and sanitary facilities. It is a source of sand for concrete and other construction material.

The capability unit is VIs-4; Shallow to Gravel range site.

Mo—Mobridge silt loam. This deep, moderately well drained, nearly level soil is in swales on uplands. It is subject to rare flooding. Areas are 20 to 100 acres in size and long and narrow. Slopes are slightly concave.

Typically, the surface layer is dark gray silt loam about 12 inches thick. The subsoil is dark grayish brown and light brownish gray, firm silty clay loam about 20 inches

thick. It is calcareous in the lower part. The underlying material to a depth of 60 inches is light yellowish brown and pale brown, firm, calcareous silty clay loam that has accumulations of carbonate. In places the subsoil contains more clay. In some areas the soil is not subject to flooding.

Included with this soil in mapping are small areas of Agar, Lowry, and Tetonka soils. These soils make up less than 10 percent of any one mapped area. The well drained Agar and Lowry soils are on slight rises along the edges of the mapped areas. The poorly drained Tetonka soils are in small depressions.

Organic matter content and fertility are high in the Mobridge soil. Permeability is moderate. Available water capacity is high. Runoff is slow. The shrink-swell potential is moderate.

Most of the acreage is cropland. Because it occurs as long and narrow areas, this soil generally is farmed along with the adjacent soils. It is well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Measures that conserve moisture are the main management needs. Leaving crop residue on the surface is an example. The soil is well suited to irrigation. Farming is delayed in some years when the soil receives runoff from adjacent uplands, but in most years the additional moisture is beneficial.

This soil is well suited to range. The native vegetation dominantly is big bluestem, western wheatgrass, and green needlegrass. Overused areas are dominated by western wheatgrass and Kentucky bluegrass. After continued overuse, Kentucky bluegrass, blue grama, and weeds dominate the site.

This soil is well suited to windbreaks and environmental plantings. The trees and shrubs that require an abundant moisture supply grow especially well.

This soil is poorly suited to most kinds of building site development and sanitary facilities because of the flooding.

The capability unit is IIc-3; Overflow range site.

Mu—Munjor fine sandy loam. This deep, well drained, nearly level soil is on the flood plain along the Missouri River. Fort Randall Dam holds back the potential floodwater in the river. Areas are 10 to 200 acres in size and generally are long and narrow. Slopes are slightly convex.

Typically, the surface layer is light brownish gray, calcareous fine sandy loam about 11 inches thick. The underlying material to a depth of 60 inches is pale brown, calcareous loamy very fine sand stratified with thin layers of finer or coarser textured material. In places it contains more silt.

Included with this soil in mapping are small areas of Haynie and Inavale soils. These soils make up less than 10 percent of any one mapped area. Haynie soils contain more silt throughout than the Munjor soil and have a darker surface layer. They are on small flats on the flood plain. Inavale soils contain more sand throughout than the Munjor soil. They are on slight rises on the flood plain.

Organic matter content and fertility are low in the Munjor soil. Permeability is moderately rapid. Available water capacity is moderate. Runoff is slow.

Most of the acreage is cropland. This soil is fairly well suited to cultivated crops. It is well suited to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Measures that control wind erosion, conserve moisture, and improve fertility are the main management needs. Examples are leaving crop residue on the surface and including grasses and legumes in the cropping system. The soil is well suited to irrigation.

This soil is well suited to native grasses, but very few areas are used for range. The native vegetation dominantly is cottonwoods and willows and an understory of bluestems and prairie sandreed. In places the stand of trees is so dense that the grasses are shaded out. Overused areas are dominated by needleandthread and western wheatgrass.

This soil is well suited to windbreaks and environmental plantings. All climatically suited trees and shrubs grow well. Those that require an abundant moisture supply grow especially well.

This soil is well suited to septic tank absorption fields. It also is well suited to building site development, but the sides of shallow excavations tend to cave in unless they are shored.

The capability unit is IIIe-7; Sandy range site.

OeF—Okaton silty clay, 15 to 40 percent slopes. This shallow, well drained, moderately steep and steep soil is on the breaks along the Missouri River. Areas are 40 to 400 acres in size and are irregular in shape or long and narrow. Slopes generally are short, steep, and convex.

Typically, the surface layer is grayish brown, calcareous silty clay about 4 inches thick. Below this is a transitional layer of grayish brown, calcareous silty clay about 8 inches thick. The underlying material, to a depth of about 17 inches, is light brownish gray, calcareous shaly clay. Light brownish gray and pale yellow, calcareous, brittle shale is at a depth of about 17 inches. About 21 inches from the surface, common nests of gypsum crystals are between the shale plates and in the cracks. In places the soil is not so friable and contains more clay.

Included with this soil in mapping are small areas of Betts and Boyd soils. These soils make up less than 10 percent of any one mapped area. Betts soils formed in glacial till. They are on knobs. Boyd soils are 25 to 35 inches deep over shale. They are on the less sloping parts of the landscape.

Organic matter content and fertility are low in the Okaton soil. Permeability is slow. Available water

capacity is very low. Runoff is rapid. The shrink-swell potential is high.

Most areas support native grasses. This soil is fairly well suited to range. The native vegetation dominantly is bluestems and sideoats grama. Overused areas are dominated by sideoats grama, blue grama, and sedges.

This soil is too steep and too shallow for cultivated crops, tame pasture and hay, windbreaks and environmental plantings, building site development, and sanitary facilities.

The capability unit is VIIe-8; Shallow range site.

Oh—Onawa fine sandy loam, overwash. This deep, somewhat poorly drained, level soil is on flood plains along the Missouri River. Fort Randall Dam holds back the potential floodwater in the river. Areas are 10 to 70 acres in size and are irregular in shape. Slopes are smooth.

Typically, the surface layer is grayish brown fine sandy loam about 9 inches thick. The subsurface layer is dark gray silty clay about 7 inches thick. The upper 29 inches of the underlying material is gray, light olive gray, and pale olive, calcareous, stratified clay and silty clay. The lower part to a depth of 60 inches is multicolored, stratified silt loam and very fine sandy loam. In places the soil is more poorly drained.

Included with this soil in mapping are small areas of the well drained Haynie soils on slight rises on the flood plain. These soils make up less than 10 percent of any one mapped area.

Organic matter content is moderate and fertility medium in the Onawa soil. Permeability is moderately slow in the upper part of the soil and moderate in the underlying material. Available water capacity is high. A seasonal high water table is 2 to 4 feet from the surface during wet periods. Runoff is slow. The shrink-swell potential is high.

Most of the acreage is cropland. This soil is well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Farming is delayed in some years because of wetness. Wind erosion also is a management concern. It can be controlled, however, by leaving crop residue on the surface and including legumes in the cropping system.

This soil is well suited to native grasses, but very few areas are used for range. The native vegetation dominantly is big bluestem and switchgrass. Scattered cottonwoods and green ash grow in some areas. Overused areas are dominated by western wheatgrass and Kentucky bluegrass.

This soil is well suited to windbreaks and environmental plantings. All climatically suited trees and shrubs grow well. Those that require an abundant moisture supply grow especially well.

This soil generally is unsuited to most kinds of building site development and sanitary facilities because of the wetness.

The capability unit is IIw-1; Subirrigated range site.

Om—Onawa silty clay. This deep, poorly drained, nearly level soil is on the flood plain along the Missouri River. Fort Randall Dam holds back the potential floodwater in the river. Areas are 10 to 330 acres in size and long and narrow. Slopes generally are smooth but in a few areas are slightly hummocky.

Typically, the surface layer is dark grayish brown silty clay about 6 inches thick. The upper 15 inches of the underlying material is grayish brown, calcareous silty clay that has a few pale olive mottles. The lower part to a depth of 60 inches is light brownish gray, mottled, calcareous, stratified silt loam, loam, very fine sand, and fine sand. In some areas the soil is more poorly drained.

Included with this soil in mapping are small areas of the sandy Inavale soils on mounds near the Missouri River. These soils make up less than 10 percent of any one mapped area.

Organic matter content is moderate and fertility medium in the Onawa soil. Tilth is poor. Permeability is moderately slow in the upper part of the soil and moderate in the lower part. Available water capacity is high. A seasonal high water table is 2 to 4 feet from the surface during wet periods. The shrink-swell potential is high.

About half of the acreage is cropland. This soil is well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. In most years planting is delayed because of wetness. Measures that improve tilth are needed. Examples are leaving crop residue on the surface and including grasses and legumes in the cropping system.

This soil is well suited to range. The native vegetation dominantly is bluestems and switchgrass. Scattered cottonwoods and green ash grow in some areas. In places the trees shade out the grasses. Overused areas are dominated by sedges, Kentucky bluegrass, and weeds.

This soil is well suited to windbreaks and environmental plantings. All climatically suited trees and shrubs grow well. Those that require an abundant moisture supply grow especially well.

This soil generally is unsuited to most kinds of building site development and sanitary facilities because of the wetness.

The capability unit is IIw-2; Subirrigated range site.

On—Onita silt loam. This deep, moderately well drained soil is in swales on uplands. It is occasionally flooded. Areas are 10 to 80 acres in size and are long and narrow. Slopes are slightly concave.

Typically, the surface layer is dark gray silt loam about 10 inches thick. The subsoil is dark grayish brown and grayish brown, friable and firm silty clay loam about 25 inches thick. It is calcareous in the lower part. The upper part of the underlying material is yellowish brown,

calcareous silty clay loam. The lower part to a depth of 60 inches is light brownish gray, calcareous clay loam.

Included with this soil in mapping are small areas of Eakin, Highmore, Homme, Hoven, and Tetonka soils. These soils make up less than 15 percent of any one mapped area. The well drained Eakin, Highmore, and Homme soils are on the higher parts of the landscape. The poorly drained Hoven and Tetonka soils are in depressions.

Organic matter content and fertility are high in the Onita soil. Permeability is moderately slow. Available water capacity is high. A seasonal high water table is at a depth of 2.5 to 6.0 feet during wet periods. Runoff is slow. The shrink-swell potential is high in the subsoil and moderate in the underlying material.

Most of the acreage is cropland. This soil is well suited to cultivated crops and to hay and tame pasture plants, such as alfalfa, intermediate wheatgrass, and smooth bromegrass. Conserving moisture is the main concern of management. Leaving crop residue on the surface and including grasses and legumes in the cropping system increase the content of organic matter and conserve moisture. In some years fieldwork is delayed because the soil receives runoff from adjacent soils, but in most years the additional moisture is beneficial.

This soil is well suited to range. The native vegetation dominantly is big bluestem and green needlegrass. Overused areas are dominated by Kentucky bluegrass.

This soil is well suited to windbreaks and environmental plantings. All climatically suited trees and shrubs grow well. Those that require an abundant moisture supply grow especially well.

This soil generally is unsuitable as a site for buildings and most sanitary facilities because of the flooding and the wetness.

The capability unit is IIc-3; Overflow range site.

Oo—Onita-Davison complex. These deep, moderately well drained, nearly level soils are on glacial plains. The Onita soil is in slightly concave swales. It is occasionally flooded. The Davison soil is on slight rises. Areas are 10 to 60 acres in size and are irregular in shape. They are 45 to 55 percent Onita soil and 30 to 40 percent Davison soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Onita soil is dark gray silty clay loam about 10 inches thick. The subsoil is dark grayish brown and grayish brown, friable and firm silty clay loam about 25 inches thick. It is calcareous in the lower part. The upper part of the underlying material is yellowish brown, calcareous silty clay loam. The lower part to a depth of 60 inches is light brownish gray, mottled, calcareous clay loam.

Typically, the surface layer of the Davison soil is dark grayish brown, calcareous loam about 7 inches thick. The next 5 inches is grayish brown, calcareous loam. The underlying material to a depth of 60 inches is light yellowish brown and pale yellow, calcareous clay loam. It has a few nests of gypsum in the lower part.

Included with these soils in mapping are small areas of Chancellor, Homme, and Tetonka soils. These included soils make up less than 15 percent of any one mapped area. The poorly drained Chancellor soils are in swales. The well drained Homme soils are on slight rises. The poorly drained Tetonka soils are in depressions.

Organic matter content is high in the Onita soil and moderate in the Davison soil. Fertility is high in the Onita soil and medium in the Davison soil. Permeability is moderately slow in the Onita soil and moderate in the Davison soil. Available water capacity is high in both soils. A seasonal high water table is at a depth of 2.5 to 6.0 feet in the Onita soil and 1.5 to 6.0 feet in the Davison soil. Runoff is slow on both soils. The shrink-swell potential is high in the Onita soil and moderate in the Davison soil.

Most of the acreage is cropland. These soils are well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. The main concerns of management are conserving moisture in the Onita soil and controlling wind erosion and improving fertility in areas of the Davison soil. Farming is delayed in some years because of wetness. The high content of lime in the Davison soil adversely affects the availability of plant nutrients. Leaving crop residue on the surface and including grasses and legumes in the cropping system conserve moisture, help to control erosion, and improve fertility.

These soils are well suited to range. The native vegetation dominantly is bluestems, green needlegrass, and western wheatgrass. Overused areas are dominated by western wheatgrass and Kentucky bluegrass. After continued overuse, Kentucky bluegrass, saltgrass, and weeds dominate the site.

These soils are well suited to windbreaks and environmental plantings. All climatically suited trees and shrubs grow well. Those that require an abundant moisture supply grow especially well.

These soils generally are unsuitable for building site development and sanitary facilities because they are wet and because the Onita soil is occasionally flooded.

The Onita soil is in capability unit IIc-3, Overflow range site; the Davison soil is in capability unit IIe-4, Limy Subirrigated range site.

Os—Onita-Hoven silt loams. These deep, nearly level soils are on uplands. The moderately well drained Onita soil is in swales. It is occasionally flooded. The poorly drained Hoven soil is in depressions. It is ponded part of the year. Areas are 15 to 100 acres in size and are long and narrow. They are 60 to 70 percent Onita soil and 20 to 30 percent Hoven soil. The two soils occur as areas so intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Onita soil is dark gray silt loam about 10 inches thick. The subsoil is dark

grayish brown and grayish brown, friable and firm silty clay loam about 25 inches thick. It is calcareous in the lower part. The upper part of the underlying material is yellowish brown, calcareous silty clay loam. The lower part to a depth of 60 inches is light brownish gray, mottled, calcareous clay loam.

Typically, the surface layer of the Hoven soil is grayish brown silt loam about 3 inches thick. The subsoil is dark gray and gray, very firm and firm silty clay about 26 inches thick. The underlying material to a depth of 60 inches is light brownish gray, calcareous clay loam. It has accumulations of carbonate. In places the surface layer is thicker.

Included with these soils in mapping are small areas of Beadle, Eakin, and Tetonka soils. These soils make up less than 15 percent of any one mapped area. The well drained Beadle and Eakin soils are on slight rises. Tetonka soils do not have columnar structure in the subsoil. Their surface layer is thicker than that of the Hoven soil.

Organic matter content is high in the Onita soil and moderate in the Hoven soil. Fertility is high in the Onita soil and low in the Hoven soil. The sodium in the Hoven soil adversely affects the growth of most plants. Permeability is moderately slow in the Onita soil and very slow in the Hoven soil. Available water capacity is high in the Onita soil and moderate in the Hoven soil. The Onita soil has a seasonal high water table at a depth of 2.5 to 6.0 feet during wet periods. The Hoven soil has one within a depth of 1.5 feet part of the year. As much as 1.0 foot of water ponds on this soil during some wet periods. Runoff is slow on the Onita soil and ponded on the Hoven soil. The shrink-swell potential is high in the subsoil of the Onita soil and moderate in the underlying material. It is high in the Hoven soil.

Most of the acreage is cropland. The Onita soil is well suited to cultivated crops and to tame pasture and hay, but the Hoven soil is poorly suited. Examples of pasture plants that grow well on the Onita soil are alfalfa, intermediate wheatgrass, and smooth bromegrass. Western wheatgrass can be grown on the Hoven soil. The main concerns of management are removing excess water and improving tilth. Leaving crop residue on the surface and delaying tillage when the soils are wet improve tilth. Controlling the runoff from adjacent soils and installing surface drains help to remove excess water.

These soils are well suited to range. The native vegetation dominantly is big bluestem on the Onita soil and western wheatgrass on the Hoven soil. Overused areas are dominated by Kentucky bluegrass on the Onita soil and sedges on the Hoven soil.

The Onita soil is well suited to windbreaks and environmental plantings, but the Hoven soil generally is unsuited. All climatically suited trees and shrubs grow well on the Onita soil, but optimum growth and survival are unlikely on the Hoven soil.

These soils generally are unsuitable as sites for buildings and most sanitary facilities because of the flooding and the ponding.

The Onita soil is in capability unit IIc-3, Overflow range site; the Hoven soil is in capability unit VIs-1, Closed Depression range site.

Ot—Onita-Tetonka silt loams. These deep, level and nearly level soils are on uplands. The moderately well drained Onita soil is in swales. It is occasionally flooded. The poorly drained Tetonka soil is in the slightly lower depressions within the swales. It is ponded part of the year. Areas are 15 to 100 acres in size and are long and narrow. They are 55 to 65 percent Onita soil and 20 to 30 percent Tetonka soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Onita soil is dark gray silt loam about 10 inches thick. The subsoil is dark grayish brown and grayish brown, friable and firm silty clay loam about 25 inches thick. It is calcareous in the lower part. The upper part of the underlying material is yellowish brown, calcareous silty clay loam. The lower part to a depth of 60 inches is light brownish gray, mottled, calcareous clay loam.

Typically, the surface layer of the Tetonka soil is dark gray silt loam about 7 inches thick. The subsurface layer is about 4 inches thick. It is gray silt loam in the upper part and dark gray silty clay loam in the lower part. The subsoil is dark gray and gray, firm silty clay about 37 inches thick. The underlying material to a depth of 60 inches is light gray clay loam.

Included with these soils in mapping are small areas of Eakin, Highmore, and Walke soils on the higher parts of the landscape. These included soils make up less than 20 percent of any one mapped area. Eakin and Highmore soils are well drained. Walke soils have a sodium affected subsoil.

Organic matter content is high in the Onita soil and moderate in the Tetonka soil. Fertility is high in the Onita soil and medium in the Tetonka soil. Tilth is poor in the Tetonka soil. Permeability is moderately slow in the Onita soil and very slow in the Tetonka soil. Available water capacity is high in both soils. The Onita soil has a seasonal high water table at a depth of 2.5 to 6.0 feet during wet periods. The Tetonka soil has one within a depth of 1.0 foot part of the year. As much as 1.0 foot of water ponds on this soil during some wet periods. Runoff is slow on the Onita soil and ponded on the Tetonka soil. The shrink-swell potential is high in the subsoil of the Onita soil and moderate in the underlying material. It is high in the Tetonka soil.

Most of the acreage is cropland. These soils are well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, Garrison creeping foxtail, intermediate wheatgrass, reed canarygrass, and smooth bromegrass. Improving the tilth of the Tetonka soil and controlling the ponding on that

soil are the main concerns in managing cultivated areas. Returning crop residue to the soil and delaying tillage when the soils are wet improve tilth. Surface drains and measures that divert the runoff from adjacent soils help to remove the excess water.

These soils are well suited to range. The native vegetation dominantly is big bluestem on the Onita soil and sedges, prairie cordgrass, western wheatgrass, and reedgrass on the Tetonka soil. Overused areas are dominated by Kentucky bluegrass.

The Onita soil is well suited to windbreaks and environmental plantings, but the Tetonka soil is poorly suited. All climatically suited trees and shrubs grow well on the Onita soil, but optimum growth and survival are unlikely on the Tetonka soil.

These soils generally are unsuitable as sites for buildings and most sanitary facilities because of the flooding and the ponding.

The Onita soil is in capability unit IIc-3, Overflow range site; the Tetonka soil is in capability unit IIw-1 if drained and in Wet Meadow range site.

Pg—Pits, gravel. These are open excavations, 5 to 30 feet deep, from which sand and gravel have been removed. They are irregular in shape and range from 2 to 50 acres in size. Slopes are uneven and broken. They range from nearly level on the pit bottoms to almost vertical on the rims. Some of the pit bottoms are covered with water.

The pit bottoms typically are sand and gravel, but they are loam or clay loam glacial till or silty glacial drift where all of the sand and gravel has been removed. Mounds of mixed loamy overburden are on the edges of the excavations. The bottoms and sides support little or no vegetation during periods when the pits are used.

Most gravel pits are used only as a source of sand and gravel for construction purposes. Some provide limited wildlife habitat. Abandoned gravel pits can be restored to range, tame pasture, or cropland if reclamation measures are applied. These measures include shaping the areas and using the mounds of overburden material as a topsoil dressing. Applying fertilizer as needed helps to establish range or pasture.

The capability unit is VIIIs-2; no range site is assigned.

PoA—Promise silty clay, 0 to 2 percent slopes. This deep, well drained, nearly level soil is on uplands, fans, and terraces. Areas are 10 to 250 acres in size and are irregular in shape. Slopes generally are smooth.

Typically, the surface layer is dark gray silty clay about 6 inches thick. The subsoil is dark grayish brown and grayish brown, extremely firm clay about 20 inches thick. In the lower part it is calcareous and has accumulations of carbonate. The underlying material to a depth of 60 inches is grayish brown and dark grayish brown, calcareous clay. In places shale is 20 to 40 inches below the surface.

Included with this soil in mapping are small areas of Dorna soils on uplands. These soils make up less than 10 percent of any one mapped area. Dorna soils formed in silty material 20 to 40 inches deep over clayey material.

Organic matter content is moderate and fertility medium in the Promise soil. Tilth is poor. Permeability is slow or very slow. Available water capacity is moderate. Runoff is slow. The shrink-swell potential is very high.

About half of the acreage supports native grasses. This soil is well suited to range. The native vegetation dominantly is western wheatgrass and green needlegrass. Overused areas are dominated by blue grama and buffalograss.

This soil is fairly well suited to cultivated crops. It is well suited to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, smooth bromegrass, and western wheatgrass. Measures that control wind erosion, improve tilth, and conserve moisture are the main management needs if cultivated crops are grown. Examples are including grasses and legumes in the cropping system and leaving crop residue on the surface.

This soil is only fairly well suited to windbreaks and environmental plantings. Windbreaks can be established, but optimum growth is unlikely.

Because of the very high shrink-swell potential, this soil is poorly suited to most kinds of building site development. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage.

Because of the very restricted permeability, this soil generally is unsuited to septic tank absorption fields. Sewage lagoons can be used as an alternative waste disposal system.

The capability unit is IIIs-1; Clayey range site.

PoB—Promise silty clay, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on uplands, fans, and terraces. Areas are 10 to 220 acres in size and are irregular in shape. Slopes generally are smooth.

Typically, the surface layer is dark gray silty clay about 6 inches thick. The subsoil is dark grayish brown and grayish brown, extremely firm clay about 20 inches thick. In the lower part it is calcareous and has accumulations of carbonate. The underlying material to a depth of 60 inches is grayish brown and dark grayish brown, calcareous clay. In places shale is 20 to 40 inches below the surface.

Included with this soil in mapping are small areas of Lane and Sansarc soils. These soils make up less than 10 percent of any one mapped area. Lane soils occur in a random pattern throughout the mapped areas. Their subsoil contains less clay than that of the Promise soil. Sansarc soils are 4 to 20 inches deep over shale. They are on the sides of drainageways and on ridges.

Organic matter content is moderate and fertility medium in the Promise soil. Tilth is poor. Permeability is

slow or very slow. Available water capacity is moderate. Runoff is medium. The shrink-swell potential is very high.

About half of the acreage supports native grasses. This soil is well suited to range. The native vegetation dominantly is western wheatgrass and green needlegrass. Overused areas are dominated by blue grama and buffalograss.

This soil is fairly well suited to cultivated crops. It is well suited to tame pasture and hay. Examples of suitable plants are alfalfa, intermediate wheatgrass, smooth bromegrass, and western wheatgrass. Measures that control erosion, improve tilth, and conserve moisture are the main management needs if cultivated crops are grown. Examples are including grasses and legumes in the cropping system and leaving crop residue on the surface. Contour farming, grassed waterways, and terraces also help to control erosion.

This soil is only fairly well suited to windbreaks and environmental plantings. Windbreaks can be established, but optimum growth is unlikely.

Because of the very high shrink-swell potential, this soil is poorly suited to most kinds of building site development. Backfilling with sandy material, providing foundation drains, and diverting runoff away from the buildings help to prevent the structural damage caused by shrinking and swelling. Reinforcing foundations and footings also helps to prevent this damage.

Because of the very restricted permeability, this soil generally is unsuited to septic tank absorption fields. Sewage lagoons can be used as an alternative waste disposal system.

The capability unit is IIIe-4; Clayey range site.

Pr—Prosper loam. This deep, moderately well drained, nearly level soil is in swales on uplands. It is occasionally flooded for very brief periods. Areas are 10 to 100 acres in size and generally are long and narrow. Slopes are slightly concave.

Typically, the surface layer is very dark gray loam about 6 inches thick. The subsurface layer is dark grayish brown loam about 5 inches thick. The subsoil is grayish brown and light brownish gray, firm and friable clay loam about 21 inches thick. In the lower part it is calcareous and has accumulations of carbonate. The underlying material to a depth of 60 inches is light brownish gray, friable clay loam. It has accumulations of carbonate in the upper part. In places the subsoil contains more clay.

Included with this soil in mapping are small areas of Clarno, Houdek, and Tetonka soils. These soils make up less than 10 percent of any one mapped area. The well drained Clarno and Houdek soils are on slight rises. The poorly drained Tetonka soils are in depressions.

Organic matter content and fertility are high in the Prosper soil. Permeability is moderate in the subsoil and moderately slow in the underlying material. Available water capacity is high. A seasonal high water table is at a depth of 3 to 6 feet part of the year. Runoff is slow. The shrink-swell potential is moderate.

Most of the acreage is cropland. This soil is well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. Conserving moisture is the main concern of management. Leaving crop residue on the surface and including grasses and legumes in the cropping system increase the content of organic matter and conserve moisture. In some years fieldwork is delayed because the soil receives runoff from adjacent soils, but in most years the additional moisture is beneficial.

This soil is well suited to range. The native vegetation dominantly is big bluestem, green needlegrass, and western wheatgrass. Overused areas are dominated by western wheatgrass. After continued overuse, Kentucky bluegrass and weeds dominate the site.

This soil is well suited to windbreaks and environmental plantings. All climatically suited trees and shrubs grow well. Those that require an abundant moisture supply grow especially well.

This soil generally is not suitable for building site development and most sanitary facilities because it is subject to flooding.

The capability unit is IIc-3; Overflow range site.

Sa—Salmo silty clay loam. This deep, poorly drained, level soil is on flood plains along large drainageways. It is frequently flooded for brief periods in the spring. Areas are 50 to 300 acres in size and are long and narrow. Slopes generally are smooth.

Typically, the surface layer is very dark gray silty clay loam about 6 inches thick. The subsurface layer is about 16 inches thick. It is very dark gray and dark gray, friable silty clay loam that has fine nests of salts. The underlying material to a depth of 60 inches is dark gray and gray, calcareous silty clay loam and silty clay. It has accumulations of carbonate in the lower part.

Included with this soil in mapping are small areas of Bon, Enet, and Napa soils. These soils make up less than 15 percent of any one mapped area. Bon soils contain more sand than the Salmo soil. They are on alluvial fans adjacent to the uplands. The well drained Enet soils are on slight rises. They are underlain by sand and gravel. Napa soils have a dense claypan subsoil. They are in microdepressions.

Organic matter content is high and fertility medium in the Salmo soil. The content of salts adversely affects the availability of plant nutrients. Tilth is poor. Permeability is moderately slow. Available water capacity is high. A seasonal high water table is within a depth of 2.5 feet. Runoff is slow. The shrink-swell potential is moderate.

Most areas support native grasses and are used for hay or grazing. This soil is well suited to range. The native vegetation dominantly is prairie cordgrass and western wheatgrass. Overused areas are dominated by western wheatgrass, Kentucky bluegrass, and saltgrass. After continued overuse, saltgrass and weeds dominate the site. Restricting use during wet periods helps to prevent surface compaction and deterioration of tilth.

This soil is poorly suited to cultivated crops and to tame pasture and hay and windbreaks and environmental plantings because of the wetness and the salinity. Tall wheatgrass and western wheatgrass are the best suited pasture plants. Climatically suited trees and shrubs can be established, but optimum survival, growth, and vigor are unlikely.

This soil is unsuited to building site development and most sanitary facilities because of the wetness and the flooding.

The capability unit is IVw-1; Saline Lowland range site.

Sm—Salmo-Napa complex. These deep, poorly drained, level soils are on flood plains along large drainageways. They are frequently flooded. The Salmo soil is in plane areas, and the Napa soil is in slightly concave areas. Areas are 30 to 430 acres in size and are long and narrow or irregularly shaped. They are 45 to 55 percent Salmo soil and 30 to 40 percent Napa soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Salmo soil is very dark gray silty clay loam about 6 inches thick. The subsurface layer is about 16 inches thick. It is very dark gray and dark gray, friable silty clay loam that has fine nests of salts. The underlying material to a depth of 60 inches is dark gray and gray silty clay and silty clay loam. It has accumulations of carbonate in the lower part.

Typically, the surface layer of the Napa soil is gray silt loam about 1 inch thick. The subsoil is very dark gray and dark gray, extremely firm and very firm silty clay about 23 inches thick. It has nests of salts. It is calcareous in the lower part. The underlying material to a depth of 60 inches is dark gray, calcareous silty clay. Gypsum crystals are in the lower part of the subsoil and the upper part of the underlying material.

Included with these soils in mapping are small areas of Bon and Enet soils. These included soils make up less than 15 percent of any one mapped area. The moderately well drained Bon soils are on alluvial fans adjacent to the uplands. The well drained Enet soils are on slight rises. They are underlain by sand and gravel.

Organic matter content is high in the Salmo soil and moderate in the Napa soil. Fertility is medium in the Salmo soil and low in the Napa soil. The content of salts in both soils adversely affects the availability of plant nutrients. Tilth is poor. Permeability is moderately slow in the Salmo soil and very slow in the Napa soil. Available water capacity is high in the Salmo soil and moderate in the Napa soil. A seasonal high water table is within a depth of 2.5 feet in the Salmo soil and 1.0 foot in the Napa soil. Runoff is slow on both soils. The shrink-swell potential is moderate in the Salmo soil and high in the Napa soil.

Most of the acreage supports native grasses and is used for hay or grazing. These soils are fairly well suited to range. The native vegetation dominantly is prairie cordgrass and western wheatgrass. The plant cover is sparse on the Napa soil. Overused areas are dominated by saltgrass and sedges. After continued overuse, saltgrass and weeds dominate the site. Restricting use during wet periods helps to prevent surface compaction and deterioration of tilth.

These soils are poorly suited to cultivated crops, tame pasture and hay, and windbreaks and environmental plantings. The main concerns in managing cultivated areas are the wetness and the high content of salts. Installing surface drains and planting salt tolerant crops help to overcome these limitations. The choice of pasture plants is limited by the wetness and the high salinity. No grass grows well on the Napa soil. Tall wheatgrass and western wheatgrass are the best suited species. Carefully selected trees and shrubs can be established, but optimum survival, growth, and vigor are unlikely.

These soils are unsuited to building site development and most sanitary facilities because of the wetness and the flooding.

The Salmo soil is in capability unit IVw-1 and the Napa soil in capability unit VIs-1; both soils are in Saline Lowland range site.

SnF—Sansarc clay, 25 to 70 percent slopes. This shallow, well drained, steep and very steep soil is on the breaks along the Missouri River. Landslides are common on the very steep slopes. Areas are 200 to 2,500 acres in size and are irregular in shape.

Typically, the surface layer is dark grayish brown clay about 4 inches thick. The upper part of the underlying material also is dark grayish brown clay. The lower part, to a depth of about 13 inches, is grayish brown shaly clay. Grayish brown, brittle shale is at a depth of about 13 inches. In places the soil is not so firm and contains less clay.

Included with this soil in mapping are small areas of Betts, Boyd, and Promise soils and some areas where shale crops out. Also included, along narrow drainageways, are soils that are similar to Promise soils but have a higher content of salts. Included soils make up less than 15 percent of any one mapped area. Betts soils formed in glacial till. They are at the higher elevations. Boyd soils are moderately deep over shale. They are in the less sloping areas. Promise soils are deep over shale. They are on foot slopes.

Organic matter content and fertility are low in the Sansarc soil. Permeability is slow. Available water capacity is low. Runoff is very rapid. The shrink-swell potential is very high.

All of the acreage supports native grasses. This soil is fairly well suited to range. The native vegetation dominantly is little bluestem, western wheatgrass, and green needlegrass. Overused areas are dominated by sideoats grama, blue grama, and sedges.

This soil is too steep and too shallow for cultivated crops, tame pasture and hay, and windbreaks and environmental plantings. It is too steep and too unstable for building site development and sanitary facilities.

The capability unit is VIIe-8; Shallow Clay range site.

SoF—Sansarc-Boyd complex, 15 to 40 percent slopes. These well drained, moderately steep and steep soils are on the breaks along the Missouri River. The shallow Sansarc soil is on convex ridges. The moderately deep Boyd soil is on side slopes and foot slopes. Landslides are common on the steep slopes. Areas are 50 to 2,000 acres in size and are irregular in shape. They are 50 to 60 percent Sansarc soil and 30 to 40 percent Boyd soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Sansarc soil is dark grayish brown clay about 4 inches thick. The upper part of the underlying material also is dark grayish brown clay. The lower part, to a depth of about 13 inches, is grayish brown shaly clay. Grayish brown, brittle shale is at a depth of about 13 inches. In places the soil is not so firm and contains less clay.

Typically, the surface layer of the Boyd soil is dark gray silty clay about 5 inches thick. The subsoil is dark grayish brown and dark gray, very firm and extremely firm, calcareous clay about 18 inches thick. The underlying material, to a depth of about 31 inches, is dark gray and grayish brown, calcareous clay and shaly clay. It has crystals of gypsum. Gray shale is at a depth of about 31 inches. It has accumulations of carbonate in cracks and seams. In places the depth to shale is more than 40 inches.

Included with these soils in mapping are small areas of Betts, Gavins, and Sully soils. These included soils make up less than 20 percent of any one mapped area. Betts soils formed in glacial till. They are on knobs and ridges. Gavins soils are shallow over siltstone. They are on the lower parts of the landscape. Sully soils are silty. They are on high ridges.

Organic matter content and fertility are low in the Sansarc soil. Organic matter content is moderate and fertility medium in the Boyd soil. Permeability is slow in both soils. Available water capacity is very low in the Sansarc soil and low in the Boyd soil. Runoff is very rapid on both soils. The shrink-swell potential is very high.

Most areas support native grasses. These soils are fairly well suited to range. The native vegetation dominantly is little bluestem, western wheatgrass, and green needlegrass. Overused areas are dominated by sideoats grama and blue grama.

These soils generally are too steep for cultivated crops, tame pasture and hay, and windbreaks and environmental plantings. They are too steep and too unstable for building site development and sanitary facilities.

The capability unit is VIIe-8; the Sansarc soil is in Shallow Clay range site, the Boyd soil in Clayey range site.

SrF—Sansarc-Rock outcrop complex, 15 to 40 percent slopes. This steep and very steep map unit occurs as areas of a shallow, well drained Sansarc soil intermingled with areas where shale crops out. It is on the breaks along the Missouri River. The Sansarc soil is on side slopes. The Rock outcrop is on convex slopes. Landslides are common on the steeper slopes. Areas are 30 to 150 acres in size and are long and irregular in shape. They are 50 to 60 percent Sansarc soil and 30 to 40 percent Rock outcrop. The Sansarc soil and the Rock outcrop occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Sansarc soil is dark grayish brown clay about 4 inches thick. The upper part of the underlying material also is dark grayish brown clay. The lower part, to a depth of about 13 inches, is grayish brown shaly clay. Grayish brown, brittle shale is at a depth of about 13 inches. In places the soil is not so firm and contains less clay.

The Rock outcrop is shale that has many manganese concretions throughout. It does not support vegetation.

Included with the Sansarc soil and Rock outcrop in mapping are small areas of Boyd and Promise soils. Also included, along narrow drainageways, are soils that are similar to Promise soils but have a higher content of salts. Included soils make up less than 15 percent of any one mapped area. Boyd soils are more than 20 inches deep over shale. They are in the less sloping areas. Promise soils are more than 40 inches deep over shale. They are on foot slopes.

Organic matter content and fertility are low in the Sansarc soil. Permeability is slow. Available water capacity is very low. Runoff is very rapid. The shrink-swell potential is very high.

In all areas the Sansarc soil supports native grasses. It is fairly well suited to range. The native vegetation dominantly is little bluestem, western wheatgrass, and green needlegrass. Overused areas are dominated by sideoats grama and blue grama. The Rock outcrop does not support grazable vegetation.

This map unit is too steep and too shallow for cultivated crops, tame pasture and hay, and windbreaks and environmental plantings. It is too steep and too unstable for building site development and sanitary facilities.

The Sansarc soil is in capability unit VIIe-8, Shallow Clay range site; the Rock outcrop is in capability unit VIIIs-2 and is not assigned to a range site.

SuE—Sully silt loam, 9 to 25 percent slopes. This deep, well drained, strongly sloping and moderately steep soil is on uplands. Areas are 20 to 400 acres in size and are long and narrow. Slopes are short and smooth.

Typically, the surface layer is grayish brown silt loam about 4 inches thick. The underlying material to a depth of 60 inches is pale brown, calcareous silt loam that has accumulations of carbonate. In places the surface layer is dark.

Included with this soil in mapping are small areas of Betts, Sansarc, and Talmo soils. These soils make up less than 20 percent of any one mapped area. Betts soils formed in glacial till. They are on the lower side slopes. The shallow Sansarc soils formed in residuum of clayey shale. They are on the steeper, lower side slopes. Talmo soils have gravelly sand within 14 inches of the surface. They are near the Missouri River.

Organic matter content and fertility are low in the Sully soil. Permeability is moderate. Available water capacity is high. Runoff is rapid.

Most of the acreage supports native grasses. This soil is fairly well suited to range. The native vegetation dominantly is western wheatgrass, little bluestem, and needleandthread. Overused areas are dominated by needleandthread and sideoats grama.

This soil is fairly well suited to tame pasture and hay. Alfalfa, intermediate wheatgrass, and smooth bromegrass are suitable.

This soil generally is too steep and too thin over the underlying material for cultivated crops and windbreaks and environmental plantings. It generally is too steep for building site development and sanitary facilities.

The capability unit is VIe-3; Thin Upland range site.

TaC—Talmo gravelly sandy loam, 2 to 9 percent slopes. This excessively drained, undulating and gently rolling soil is in abandoned gravel pits on uplands. The pits are open excavations from which several feet of soil and sand and gravel have been removed. They are now partly revegetated. Areas are irregular in shape and range from 4 to 50 acres in size.

Typically, the surface layer is dark grayish brown, calcareous gravelly sandy loam about 3 inches thick. The underlying material to a depth of 60 inches is multicolored, calcareous gravelly sand. In places the depth to gravelly sand is more than 20 inches.

Organic matter content and fertility are low. Permeability is rapid. Available water capacity is very low. Runoff is slow.

Most areas support native grasses, but this soil is poorly suited to range. The native vegetation dominantly is blue grama and needleandthread. Overused areas are dominated by threadleaf sedge, blue grama, and weeds.

This soil generally is unsuited to cultivated crops, tame pasture and hay, and windbreaks and environmental plantings. Some trees and shrubs can be grown as environmental plantings and other special plantings if they are planted by hand and given special care.

This soil is poorly suited to most kinds of building site development and sanitary facilities because of the irregular slopes and the likelihood that effluent will pollute shallow ground water. Considerable land shaping is needed to develop satisfactory sites. The soil is a probable source of sand and gravel for use as road construction material.

The capability unit is VIs-4; Very Shallow range site.

TbE—Talmo-Betts complex, 9 to 25 percent slopes. These strongly sloping and moderately steep soils are on uplands. The excessively drained Talmo soil is on ridges. It is very shallow over gravelly sand. The deep, well drained Betts soil is on side slopes. Areas are 5 to 40 acres in size and are long and narrow. They are 65 to 75 percent Talmo soil and 20 to 30 percent Betts soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Talmo soil is dark grayish brown gravelly loam about 7 inches thick. The underlying material to a depth of 60 inches is multicolored, calcareous gravelly sand. In places the depth to gravelly sand is more than 14 inches.

Typically, the surface layer of the Betts soil is dark grayish brown, calcareous loam about 3 inches thick. The subsoil is brown, friable, calcareous clay loam about 6 inches thick. The underlying material to a depth of 60 inches is pale yellow, calcareous clay loam that has accumulations of carbonate.

Included with these soils in mapping are small areas of the shallow Sansarc soils on the steeper, lower side slopes. These included soils make up less than 10 percent of any one mapped area. They formed in residuum of clayey shale.

Organic matter content and fertility are low in the Talmo and Betts soils. Permeability is rapid in the Talmo soil. It is moderate in the upper part of the Betts soil and moderately slow in the underlying material. Available water capacity is very low in the Talmo soil and high in the Betts soil. Runoff is slow on the Talmo soil and rapid on the Betts soil.

Most of the acreage supports native grasses, but these soils are poorly suited to range. The native vegetation on the Talmo soil dominantly is needleandthread, sideoats grama, and blue grama. That on the Betts soil dominantly is little bluestem and needlegrasses. Overused areas are dominated by sedges, buffalograss, and grama grasses. After continued overuse, threadleaf sedge and forbs dominate the site.

These soils generally are too steep and too thin over the underlying material for cultivated crops, tame pasture and hay, and windbreaks and environmental plantings. They are too steep for most kinds of building site development and sanitary facilities. The Talmo soil is a probable source of sand and gravel for use as road construction material.

The Talmo soil is in capability unit VIs-4, Very Shallow range site; the Betts soil is in capability unit VIe-3, Thin Upland range site.

Te—Tetonka silt loam. This deep, poorly drained soil is in depressions in the uplands. It is ponded during periods of snowmelt and heavy rainfall. Areas are 5 to 80 acres in size and are oval or oblong.

Typically, the surface layer is dark gray silt loam about 7 inches thick. The subsurface layer is about 6 inches

thick. It is gray silt loam in the upper part and dark gray and gray silt loam and silty clay in the lower part. The subsoil is dark gray and gray, firm silty clay about 37 inches thick. In the lower part it is calcareous and has accumulations of carbonate that extend into the underlying material. The underlying material to a depth of 60 inches is light gray, calcareous clay loam. In places the surface layer is thinner. In some areas the soil does not have a gray subsurface layer.

Included with this soil in mapping are small areas of Hoven and Onita soils. These soils make up less than 10 percent of any one mapped area. Hoven soils have a sodium affected subsoil. They are in positions on the landscape similar to those of the Tetonka soil. The moderately well drained Onita soils are in swales.

Organic matter content is moderate and fertility medium in the Tetonka soil. Permeability is very slow. Available water capacity is high. A seasonal high water table is within a depth of 1 foot most of the year. As much as 1 foot of water ponds on the surface during some wet periods. Runoff is ponded. The shrink-swell potential is high.

Most areas support native grasses. This soil is fairly well suited to range. The native vegetation dominantly is sedges, prairie cordgrass, western wheatgrass, and reedgrass. Overused areas are dominated by foxtail barley, spike sedge, and rushes. Many areas are potential sites for excavated ponds.

Unless drained, this soil is poorly suited to cultivated crops and generally is unsuited to windbreaks and environmental plantings. The best suited crops are those that mature late in the growing season. The main concern of management is improving drainage. In undrained areas, crops drown out and tillage is delayed for long periods in some years.

This soil is fairly well suited to tame pasture and hay, but only the water tolerant pasture plants grow well in undrained areas. Garrison creeping foxtail and reed canarygrass are the best suited species. All climatically suited pasture plants grow well in drained areas.

This soil generally is unsuitable as a site for buildings and most sanitary facilities because of the ponding.

The capability unit is IVw-1; Wet Meadow range site.

Tn—Tetonka-Chancellor silty clay loams. These deep, poorly drained, nearly level soils are in swales on uplands. The Tetonka soil is in the concave part of the swales, and the Chancellor soil is at the edge of the swales. The Tetonka soil is ponded and the Chancellor soil frequently flooded during periods of snowmelt and heavy runoff. Areas are 5 to 30 acres in size and are long and narrow. They are 55 to 65 percent Tetonka soil and 25 to 35 percent Chancellor soil. The two soils occur as areas so closely intermingled or so small that mapping them separately is not practical.

Typically, the surface layer of the Tetonka soil is dark gray silty clay loam about 7 inches thick. The subsurface layer is silty clay loam about 6 inches thick. It is gray in the upper part and dark gray and gray in the lower part. The subsoil is dark gray and gray, firm silty clay about 37 inches thick. In the lower part it is calcareous and has accumulations of carbonate that extend into the underlying material. The underlying material to a depth of 60 inches is light gray, calcareous clay loam.

Typically, the surface layer of the Chancellor soil is very dark gray silty clay loam about 15 inches thick. The subsoil is very dark gray, olive gray, and olive, firm silty clay about 21 inches thick. In the lower part it is calcareous and has accumulations of carbonate that extend into the underlying material. The underlying material to a depth of 60 inches is light olive gray and pale olive, calcareous silty clay loam.

Included with these soils in mapping are small areas of Davison, Homme, Onita, and Salmo soils. These included soils make up less than 20 percent of any one mapped area. Davison soils have free carbonates in the surface layer. They are on slight rises. The well drained Homme and moderately well drained Onita soils are higher on the landscape than the Tetonka and Chancellor soils. Salmo soils are shallower to concentrations of salts than the Tetonka and Chancellor soils. They occur as areas intermingled with areas of the Chancellor soil near the edges of the swales.

Organic matter content is moderate in the Tetonka soil and high in the Chancellor soil. Fertility is medium in the Tetonka soil and high in the Chancellor soil. Permeability is very slow in the Tetonka soil and slow in the Chancellor soil. Available water capacity is high in both soils. A seasonal high water table is within a depth of 1 foot most of the year in the Tetonka soil. As much as 1 foot of water ponds on this soil during some wet periods. The Chancellor soil has a seasonal high water table within a depth of 3 feet during wet periods. Runoff is ponded on the Tetonka soil. It is very slow on the Chancellor soil. The shrink-swell potential is high in both soils.

Most of the acreage is cropland. If adequately drained, these soils are suited to cultivated crops. The main management needs are measures that control the flooding caused by runoff from adjacent soils and that improve tilth. Returning crop residue to the soil and delaying tillage when the soils are wet help to prevent deterioration of tilth. Diverting the runoff from adjacent soils and installing surface drains help to control excess water.

These soils are fairly well suited to tame pasture and hay. Alfalfa, Garrison creeping foxtail, intermediate wheatgrass, reed canarygrass, and smooth bromegrass are suitable.

These soils are well suited to windbreaks and environmental plantings. All climatically suited trees and shrubs grow well. Those that require an abundant moisture supply grow especially well.

These soils are well suited to range. The native vegetation dominantly is sedges, prairie cordgrass, western wheatgrass, and reedgrass on the Tetonka soil

and big bluestem on the Chancellor soil. Overused areas are dominated by Kentucky bluegrass.

These soils generally are not suitable for building site development and most sanitary facilities because of the flooding and the ponding.

The capability unit is IIw-1; the Tetonka soil is in Wet Meadow range site, the Chancellor soil in Overflow range site.

Wd—Wendte Variant silty clay. This deep, somewhat poorly drained, nearly level soil is on the flood plain along the Missouri River. It is near the base of the Missouri River escarpment. It is occasionally flooded during periods of heavy rainfall or rapid snowmelt. The flooding occurs only as local runoff, however, because Fort Randall Dam holds back the potential floodwater in the river. Areas are 10 to 160 acres in size and long and narrow or irregularly shaped.

Typically, the surface layer is grayish brown silty clay about 7 inches thick. The underlying material to a depth of 60 inches is light brownish gray, grayish brown, and pale brown, calcareous, stratified silty clay and silty clay loam. In places the soil is more poorly drained.

Included with this soil in mapping are small areas of Aowa and Promise soils. These soils make up less than 10 percent of any one mapped area. The moderately well drained Aowa soils are on alluvial fans of short drainageways adjacent to the uplands. They contain less clay than the Wendte Variant soil. The well drained Promise soils are on foot slopes and fans.

Organic matter content and fertility are high in the Wendte Variant soil. Permeability is slow. Available water capacity is moderate. A seasonal high water table is at a depth of 3 to 5 feet. Runoff is slow. The shrink-swell potential is high.

Most of the acreage is cropland. This soil is well suited to cultivated crops and to tame pasture and hay. Examples of suitable pasture plants are alfalfa, intermediate wheatgrass, and smooth bromegrass. In most years fieldwork is delayed because the soil receives runoff from adjacent soils. Measures that conserve moisture are needed. Examples are leaving crop residue on the surface and including grasses and legumes in the cropping system.

This soil is well suited to windbreaks and environmental plantings. All climatically suited trees and shrubs grow well. Those that require an abundant moisture supply grow especially well.

This soil is well suited to range. The native vegetation dominantly is cottonwood, green ash, and shrubs and an understory of western wheatgrass, big bluestem, and green needlegrass. Overgrazed areas are dominated by blue grama and Kentucky bluegrass.

This soil generally is unsuited to building site development and sanitary facilities because of the flooding and the wetness.

The capability unit is IIIw-1; Overflow range site.

Wo—Worthing silty clay loam. This deep, very poorly drained, level soil is in depressions in the uplands. It is ponded during periods of snowmelt or heavy rainfall. Areas are 5 to 120 acres in size and are irregular in shape.

Typically, the surface layer is dark gray silty clay loam about 9 inches thick. The subsoil is dark gray, firm silty clay about 35 inches thick. The underlying material to a depth of 60 inches is gray silty clay. In places the soil has a light gray subsurface layer. In some areas the surface layer is less than 8 inches thick.

Included with this soil in mapping are small areas of Hoven and Onita soils. These soils make up less than 15 percent of any one mapped area. Hoven soils have a sodium affected subsoil. The moderately well drained Onita soils are near the edges of the depressions. Hoven soils are in positions on the landscape similar to those of the Worthing soil.

Organic matter content and fertility are high in the Worthing soil. Permeability is slow. Available water capacity is moderate. A seasonal high water table is within a depth of 1 foot. As much as 1 foot of water ponds on the surface during some wet periods. Runoff is ponded. The shrink-swell potential is high.

Most areas support native grasses. This soil is fairly well suited to range. The native vegetation dominantly is rivergrass, slough sedge, prairie cordgrass, and reedgrass. Overused areas are dominated by spike sedge and unpalatable grasses and weeds. Many areas are potential sites for excavated ponds.

This soil generally is unsuited to cultivated crops and to windbreaks and environmental plantings and is fairly well suited to tame pasture and hay. Because the soil is frequently ponded, the number of suitable crops and pasture plants is severely limited. Garrison creeping foxtail and reed canarygrass are the best suited pasture plants.

This soil generally is unsuitable as a site for buildings and septic tank absorption fields because of the ponding.

The capability unit is Vw-4; Shallow Marsh range site.

Wp—Worthing silty clay loam, ponded. This deep, very poorly drained, level soil is in depressions in the uplands. It is ponded most of the year. Areas are 5 to 200 acres in size and are circular.

Typically, the surface layer is dark gray silty clay loam about 9 inches thick. The subsoil is dark gray, firm silty clay about 35 inches thick. The underlying material to a depth of 60 inches is gray silty clay. In some places a thin layer of partly decomposed organic material is at the surface. In other places the subsoil and underlying material have accumulations of salts. In some areas the soil has a light gray subsurface layer. In other areas the surface layer is less than 8 inches thick.

Organic matter content and fertility are high. Permeability is slow. Available water capacity is moderate. A seasonal high water table is within a depth

of 0.5 foot. As much as 3.0 feet of water ponds on the surface during some wet periods. Runoff is ponded. The shrink-swell potential is high.

Most areas support native vegetation and are used as wetland wildlife habitat. The natural plant cover is a luxuriant stand of bulrush, reedgrass, and sedges. Many areas are potential sites for excavated ponds.

This soil generally is unsuited to cultivated crops and to tame pasture and hay and windbreaks and environmental plantings. It is unsuitable as a site for buildings and sanitary facilities because of the ponding.

The capability unit is VIIIw-1; no range site is assigned.

prime farmland

Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. It is of major importance in providing the Nation's short- and long-range needs for food and fiber. Because the supply of high quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban and built-up land or water areas. It either is used for food or fiber crops or is available for those uses. The soil qualities, growing season, and moisture supply are those needed for a well managed soil economically to produce a sustained high yield of crops.

Prime farmland has an adequate and dependable supply of moisture. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Soil Conservation Service.

About 57,590 acres in Charles Mix County, or 8 percent of the total land area, meets the requirements for prime farmland. About 15,000 acres of this land is irrigated. The main crops are corn, grain sorghum, and alfalfa.

The map units in Charles Mix County that are considered prime farmland are listed in this section. Some of these map units meet the requirements for prime farmland only in areas where the soil is irrigated. Onsite investigation is needed to determine whether or not a specific area of these map units is prime farmland. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed soil map units."

The map units that meet the requirements for prime farmland are:

AaA—Agar silt loam, 0 to 2 percent slopes (where irrigated)
AaB—Agar silt loam, 2 to 6 percent slopes (where irrigated)
Ao—Aowa silty clay loam
Bn—Bon silt loam
DnA—Dorna silt loam, 0 to 4 percent slopes (where irrigated)
EaA—Eakin silt loam, 0 to 2 percent slopes (where irrigated)
Hb—Haynie silt loam (where irrigated)
HgA—Highmore silt loam, 0 to 2 percent slopes (where irrigated)
HhB—Highmore-Eakin silt loams, 2 to 6 percent slopes (where irrigated)
LoA—Lowry silt loam, 0 to 2 percent slopes (where irrigated)
LoB—Lowry silt loam, 2 to 6 percent slopes (where irrigated)
Mo—Mobridge silt loam
Mu—Munjor fine sandy loam (where irrigated)
On—Onita silt loam
Pr—Prosper loam

use and management of the soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

crops and pasture

Wayne L. Noble, district conservationist, Soil Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed soil map units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

About 57 percent of the acreage in Charles Mix County is used for cultivated crops or for tame pasture and hay. The major crops are alfalfa, corn, oats, and grain sorghum. Barley and wheat also are grown. Corn is grown for grain and silage, oats and sorghum for grain, and alfalfa mainly for hay. Alfalfa and bromegrass are grown as tame pasture plants.

The potential of the soils in the county for increased crop production is good. About 64,600 acres of potentially good cropland is currently used as range, 36,300 acres as pasture, and 40,200 acres as hayland (*12*). Food production could be increased considerably by extending the latest crop production technology to all cropland in the county. This soil survey can greatly facilitate the application of such technology. The paragraphs that follow describe the management needed on the cropland in the county.

Water erosion reduces productivity and results in sedimentation. Productivity is reduced when the more fertile surface layer is lost and part of the subsoil is incorporated into a plow layer. Loss of the surface layer is especially damaging on soils that have a thin surface layer, such as Ethan soils. Erosion also reduces the productivity of soils that tend to be droughty, such as Delmont soils. When erosion occurs, sediment rich in nutrients enters streams and lakes. Measures that control erosion minimize the pollution of streams and lakes by sediment and preserve water quality for fish and wildlife, recreation, and municipal use. They also reduce the amount of fertilizer needed in cropped areas and prevent the removal of plant nutrients.

A cropping system that keeps a plant cover on the surface for extended periods holds soil losses to an amount that does not reduce the productive capacity of the soils. If a plant cover cannot protect the soil, careful management of crop residue is essential. Minimizing tillage and leaving crop residue on the surface increase the infiltration rate, reduce the runoff rate, and help to control erosion.

Terraces and diversions reduce the length of slopes and the runoff rate and help to control erosion. They are

most practical on deep, well drained soils that have long, smooth slopes. Many of the soils in Charles Mix County are poorly suited to terraces and diversions because of short, irregular slopes or an unfavorable subsoil, which would be exposed in terrace channels.

Wind erosion is a slight to severe hazard on many of the soils in the county. The hazard is especially severe on the Henkin, Inavale, and Munjor soils. Wind erosion can damage these soils in a few hours if winds are strong and the soils are dry and are not protected by a plant cover or surface mulch. An adequate plant cover, a cover of crop residue, and a rough surface help to control wind erosion. Windbreaks of suitable trees and shrubs also are effective.

Information about the measures that control erosion on each kind of soil is contained in the Technical Guide, available in the local offices of the Soil Conservation Service.

Soil fertility helps to determine the yields that can be obtained from the soil. It can be improved by applying fertilizer and by including grasses and legumes in the cropping system. The kinds and amounts of fertilizer needed on Ethan and other soils that have a high content of lime in the surface layer generally differ from the kinds and amounts needed on soils that do not have lime in the surface layer. On all soils additions of fertilizer should be based on the results of soil tests, on the need of the crop, and on the expected yield level. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer needed.

Soil tilth is an important factor in the germination of seeds and the infiltration of water into the soil. Soils with good tilth are granular and porous. In Beadle, Promise, and Walke soils, tilth is poor or fair. These soils dry out slowly in the spring and cannot be easily tilled when dry. If they are farmed when wet, they tend to be cloddy when dry. As a result of the cloddiness, preparing a seedbed is difficult. Timely tillage, inclusion of grasses and legumes in the cropping system, and incorporation of crop residue into the soil improve tilth and increase the rate of water intake.

Field crops suited to the soils and climate of the survey area include close-grown crops and row crops. Oats and barley are the main close-grown crops. Corn and sorghum are the main row crops. The acreage planted to sunflowers is increasing.

The deep, well drained or moderately well drained soils in the survey area are suited to all of the crops commonly grown in the county. Examples are Agar, Aowa, Bon, Clarno, Eakin, Highmore, Homme, Lane, Onita, and Prosper soils. Delmont and other droughty soils are better suited to early maturing small grain than to deeper rooted crops, such as corn and alfalfa, because the porous underlying material limits the depth to which roots can penetrate and the available water capacity. Henkin, Munjor, and other soils that are susceptible to wind erosion are better suited to close-grown crops than to other crops.

Many of the deep, well drained soils are suited to irrigation. Examples are Agar, Enet, Hand, Highmore, and Lowry soils. The main concerns of management are conserving moisture, improving fertility and tilth, and, on soils that have a slope of more than 2 percent, controlling erosion. The quality of irrigation water is a concern if water from a well is used. The best water has a low content of salts and sodium.

Pasture plants best suited to the climate and most of the soils in the survey area include alfalfa, intermediate wheatgrass, and smooth bromegrass. Delmont, Enet, and other droughty soils are suited to crested wheatgrass. Because of the hazard of erosion, bunchgrasses, such as crested wheatgrass, should not be planted in areas where the slope is more than 6 percent. On the poorly drained Chancellor, Hoven, and Tetonka soils and the very poorly drained Worthing soils, the choice of pasture plants is limited to water tolerant species, such as Garrison creeping foxtail and reed canarygrass.

If the pasture is overgrazed, the grasses lose vigor and die and usually are replaced by annual grasses and weeds. Proper stocking rates, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition.

yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that insures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the

Cooperative Extension Service can provide information about the management and productivity of the soils.

land capability classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit (*10*). These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have slight limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-1 or IIIe-6.

The capability classification of each map unit is given in the section "Detailed soil map units."

rangeland

Wayne L. Noble, district conservationist, Soil Conservation Service, helped prepare this section.

About 34 percent of the acreage of Charles Mix County is rangeland. Most of the rangeland occurs in large tracts of the Betts, Ethan, and Sansarc soils on the breaks along the Missouri River, but some occurs as small tracts throughout the county. More than 60 percent of the local farm income is derived from the sale of livestock, principally cattle. Cow-calf enterprises are dominant throughout the county. On a few feedlots and farms, a small number of cattle are fed until they are ready for market. On many farms the forage produced on rangeland is supplemented with crop aftermath. In winter the forage is supplemented with protein concentrate.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Table 6 shows, for most of the soils in the survey area, the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. An explanation of the column headings in table 6 follows.

A *range site* is a distinctive kind of rangeland that produces a characteristic natural plant community that differs from natural plant communities on other range sites in kind, amount, and proportion of range plants. The relationship between soils and vegetation was ascertained during this survey; thus, range sites generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table are also important.

Total production is the amount of vegetation that can be expected to grow annually on well managed

rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight is the total annual yield per acre reduced to a common percent of air-dry moisture.

Characteristic vegetation—the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil—is listed by common name. Under *composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range condition. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. Range condition is an ecological rating only.

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, control of undesirable brush species, conservation of water, and control of wind and water erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

The native vegetation in most parts of the county has been greatly depleted by continued excessive use. The amount of forage produced is less than half of that originally produced. The productivity of the range can be increased by applying management that is effective on specific kinds of soil and range sites.

An adequate plant cover and ground mulch help to control erosion and increase the moisture supply by reducing the runoff rate. If the range is overgrazed, the more desirable tall grasses lose vigor and are replaced by less productive short grasses. Measures that prevent overgrazing help to keep the range in good condition. Crossfencing and properly distributed watering facilities help to obtain a uniform distribution of grazing.

native woods and windbreaks and environmental plantings

Wayne L. Noble, district conservationist, Soil Conservation Service, helped prepare this section.

Native trees and shrubs grow on about 5,800 acres in Charles Mix County. They generally grow where soil and water relationships are favorable. Most grow on the flood plain along the Missouri River and on the flood plains and breaks along the deeper drainageways. Nearly all of the wooded areas are used as wildlife habitat.

Scattered individual plants or clumps of American elm, American plum, boxelder, bur oak, common chokecherry, common hackberry, false indigo, green ash, western snowberry, and wild rose are common on the Betts, Ethan, and Sully soils in drainageways. Peachleaf willow, plains cottonwood, and sandbar willow are common on the Inavale and Munjor soils. Russian-olive, an introduced species, is common on nearly all of the soils in the county.

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, keep snow from blowing off the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To insure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 7 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 7 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens.

Grazing is detrimental to windbreaks and environmental plantings because the livestock compact the soil and remove the lower branches of the trees and shrubs. The compaction retards growth. Removal of the lower branches reduces the effectiveness of the windbreaks. Weeds and insects prevent maximum growth. Clean cultivation and applications of herbicide help to control the weeds. Fallowing a year before planting helps to provide a reserve supply of moisture, which is needed before seedlings can be established. On Henkin and other soils that are susceptible to wind erosion, the site should be prepared in the spring.

Additional information about planning windbreaks and screens and planting and caring for trees and shrubs

can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service or from a nursery.

recreation

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

wildlife habitat

John B. Farley, biologist, Soil Conservation Service, helped prepare this section.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges and management areas, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer,

available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are barley, corn, millet, oats, sunflower, and wheat.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are alfalfa, intermediate wheatgrass, smooth bromegrass, and yellow sweetclover.

Wild herbaceous plants are native or naturally established grasses, forbs, and sedges. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are big and little bluestem, blue grama, common sunflower, goldenrod, switchgrass, threadleaf sedge, and western wheatgrass.

Hardwood trees are planted trees and shrubs that produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are American elm, apple, boxelder, bur oak, green ash, hackberry, and plains cottonwood. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are American plum, common chokecherry, cotoneaster, crabapple, honeysuckle, and Russian-olive.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are cattail, inland saltgrass, prairie cordgrass, reeds, rushes, sedges, smartweed, and wild millet.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are duck fields, level ditches, marshes, ponds, and shallow dugouts.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, forbs, and shrubs. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite, eastern cottontail, field sparrow, gray partridge, western meadowlark, mourning dove, red fox, ring-necked pheasant, whitetail jackrabbit, and whitetail deer.

Habitat for wetland wildlife consists of marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, mink, muskrat, and shore birds.

Habitat for rangeland wildlife consists of areas of native shrubs and herbaceous plants. Wildlife attracted to rangeland include lark bunting, meadowlarks, sharp-tailed grouse, whitetail deer, and whitetail jackrabbit.

engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial,

and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

building site development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

sanitary facilities

Table 11 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent,

surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons (aerobic) are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 5 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

construction materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

water management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include

less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances, such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

soil properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 17.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

engineering index properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil series and their morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 or 20 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as Pt. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 17.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The

estimates are based on test data from the survey area or from nearby areas and on field examination.

physical and chemical properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K in this survey area range from 0.10 to 0.43. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind and water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion and the amount of soil lost. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.
2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.
3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are

moderately erodible. Crops can be grown if measures to control wind erosion are used.

5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.
6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.
7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.
8. Stony or gravelly soils and other soils not subject to wind erosion.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

soil and water features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt and water in swamps and marshes are not considered flooding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An artesian water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A perched water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations generally can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavations.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

engineering index test data

Table 17 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are representative of the series. The soil samples were analyzed by the South Dakota Department of Transportation, Division of Highways.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are: AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); and Moisture density, Method A—T 99 (AASHTO), D 698 (ASTM).

classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*11*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. In table 18, the soils of the survey area are classified according to the system. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ustoll (*Ust*, meaning intermittent dryness, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplustolls (*Hapl*, meaning minimal horizonation, plus *ustoll*, the suborder of the Mollisols that have an ustic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplustolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, mesic Typic Haplustolls.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the underlying material can differ within a series.

soil series and their morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (*9*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*11*). Unless otherwise stated, matrix colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed soil map units."

Agar series

The Agar series consists of deep, well drained soils formed in loess on uplands. Permeability is moderate. Slopes range from 0 to 9 percent.

Agar soils are similar to Eakin, Highmore, and Homme soils and commonly are near Eakin, Highmore, Lowry, Mobridge, and Sully soils. Eakin, Highmore, and Homme soils formed in silty glacial drift. Also, Eakin soils have clay loam glacial till at a depth of 20 to 40 inches. Lowry and Sully soils are on the higher parts of the landscape near the Missouri River. Lowry soils contain less clay in the subsoil than the Agar soils. Sully soils do not have a

mollic epipedon. The moderately well drained Mobridge soils are in swales. They have a mollic epipedon that is more than 20 inches thick.

Typical pedon of Agar silt loam, 0 to 2 percent slopes, 150 feet north and 2,540 feet east of the southwest corner of sec. 29, T. 96 N., R. 65 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, very dark gray (10YR 3/1) moist; weak medium platy structure parting to weak fine granular; soft, very friable; slightly acid; abrupt smooth boundary.

B21t—6 to 10 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak medium and fine prismatic structure parting to weak medium and fine subangular blocky; soft, friable, slightly sticky; neutral; clear smooth boundary.

B22t—10 to 18 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, firm, sticky; neutral; clear smooth boundary.

B3ca—18 to 31 inches; pale brown (10YR 6/3) silty clay loam, dark brown (10YR 4/3) moist; weak coarse subangular blocky structure parting to moderate medium and fine blocky and subangular blocky; slightly hard, firm, slightly sticky; few fine accumulations of carbonate; strong effervescence; mildly alkaline; clear wavy boundary.

C1ca—31 to 38 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark brown (10YR 4/3) moist; weak coarse blocky structure; slightly hard, friable, slightly sticky; few fine accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.

C2ca—38 to 48 inches; light brownish gray (2.5Y 6/2) silty clay loam, light olive brown (2.5Y 5/3) moist; common fine faint light gray (5Y 7/1) and common fine distinct brownish yellow (10YR 6/8) mottles; massive; slightly hard, friable, slightly sticky; common fine accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.

C3—48 to 60 inches; light brownish gray (2.5Y 6/2) silt loam, light olive brown (2.5Y 5/3) moist; massive; soft, very friable, slightly sticky; few fine accumulations of carbonate; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 20 to 40 inches. The depth to free carbonates ranges from 14 to 26 inches. The mollic epipedon is 10 to 20 inches thick.

The A horizon has value of 4 or 5 (2 or 3 moist) and chroma of 1 or 2. It is slightly acid or neutral and is 4 to 8 inches thick. The B2t horizon has hue of 10YR or 2.5Y, value of 4 or 5 (3 or 4 moist), and chroma of 2 or 3. It is neutral or mildly alkaline. The C horizon has hue of 10YR or 2.5Y, value of 5 to 7 (4 to 6 moist), and chroma of 2 or 3. It has few to many soft accumulations of carbonate.

Albaton series

The Albaton series consists of deep, very poorly drained and poorly drained soils formed in clayey alluvium on the flood plain along the Missouri River. Permeability is slow. Slopes range from 0 to 2 percent.

The Albaton soils in this county receive somewhat less precipitation than is defined as the range for the series. This difference, however, does not significantly alter the use or behavior of the soils.

Albaton soils are similar to Onawa and Wendte Variant soils and commonly are near Aowa, Haynie Variant, and Munjor soils. All of these similar and nearby soils are on the flood plain along the Missouri River. Aowa, Haynie Variant, and Munjor soils do not contain so much clay between depths of 10 and 40 inches as the Albaton soils. Aowa soils are moderately well drained. The surface layer of the Haynie Variant and Munjor soils is lighter colored than that of the Albaton soils. Onawa soils have a dominantly loamy layer within a depth of 30 inches. Wendte Variant soils are somewhat poorly drained.

Typical pedon of Albaton silty clay, 2,500 feet west and 2,500 feet south of the northeast corner of sec. 20, T. 93 N., R. 62 W.

Ap—0 to 9 inches; grayish brown (2.5Y 5/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; weak medium subangular blocky structure parting to weak fine granular; hard, firm, sticky and plastic; slight effervescence; mildly alkaline; clear smooth boundary.

C1g—9 to 32 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; stratified with thin layers of silty clay loam and silt; common fine faint gray (2.5Y 5/1) and light yellowish brown (2.5Y 6/4) mottles; massive; hard, firm, sticky and plastic; slight effervescence; mildly alkaline; gradual wavy boundary.

C2g—32 to 60 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; stratified with thin layers of silty clay loam and silt; common fine faint gray (2.5Y 5/1) and light yellowish brown (2.5Y 6/4) mottles; massive; very hard, very firm, sticky and plastic; strong effervescence; mildly alkaline.

Free carbonates generally are at the surface. The A horizon, or the solum, is 6 to 9 inches thick. It has hue of 10YR or 2.5Y, value of 4 or 5 (2 or 3 moist), and chroma of 1 or 2. The C horizon is neutral in hue or has hue of 2.5Y or 5Y, value of 5 or 6 (3 or 4 moist), and chroma of 1 or 2.

Aowa series

The Aowa series consists of deep, moderately well drained soils formed in silty alluvium on the flood plain along the Missouri River. Permeability is moderate. Slopes range from 0 to 2 percent.

Aowa soils are similar to Haynie soils and commonly are near Albaton, Haynie, Haynie Variant, and Wendte Variant soils. The poorly drained and very poorly drained Albaton soils are slightly lower on the flood plain than the Aowa soils. Haynie soils contain less clay between depths of 10 and 40 inches than the Aowa soils. Haynie Variant soils are on narrow, convex ridges. Their surface layer is lighter colored than that of the Aowa soils. The somewhat poorly drained Wendte Variant soils are near the outer edges of the flood plain. They contain more clay between depths of 10 and 40 inches than the Aowa soils.

Typical pedon of Aowa silty clay loam, 180 feet south and 2,330 feet west of the northeast corner of sec. 9, T. 93 N., R. 63 W.

Ap—0 to 8 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; hard, friable; mildly alkaline; abrupt smooth boundary.

A12—8 to 19 inches; grayish brown (10YR 5/2) stratified silty clay loam and silt loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak fine and medium granular; hard, friable; slight effervescence; mildly alkaline; clear smooth boundary.

C1—19 to 45 inches; pale brown (10YR 6/3) and light brownish gray (10YR 6/2) stratified silt loam and silty clay loam, grayish brown (10YR 5/2) moist; finely laminated; slightly hard, friable; strong effervescence; moderately alkaline; gradual smooth boundary.

C2—45 to 60 inches; brown (10YR 5/3) and pale brown (10YR 6/3) silt loam, dark brown (10YR 4/3) and brown (10YR 5/3) moist; finely laminated; slightly hard, friable; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 6 to 10 inches. In some pedons the A horizon has free carbonates. It has value of 4 or 5 (2 or 3 moist) and chroma of 1 to 3. It dominantly is silty clay loam, but the range includes silt loam. The C horizon has hue of 10YR or 2.5Y, value of 5 or 6 (3 to 5 moist), and chroma of 2 or 3. In some pedons it has thin strata of fine sandy loam and silty clay. Few or common light yellowish brown mottles are on the surface of the laminations in some pedons.

Arlo series

The Arlo series consists of deep, poorly drained and very poorly drained soils formed in loamy alluvial sediments over gravelly loamy sand. These soils are in swales on uplands and on glacial outwash plains. Permeability is moderate in the solum and rapid in the underlying material. Slopes range from 0 to 2 percent.

Arlo soils commonly are near Delmont, Enet, and Talmo soils. Delmont soils are somewhat excessively drained, Enet soils are well drained, and Talmo soils are excessively drained. All three are higher on the landscape than the Arlo soils.

Typical pedon of Arlo loam, in an area of Arlo-Enet loams, 0 to 2 percent slopes, 1,140 feet west and 220 feet north of the southeast corner of sec. 3, T. 97 N., R. 63 W.

A1—0 to 9 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; moderate very fine and fine granular structure; slightly hard, friable; strong effervescence; mildly alkaline; clear smooth boundary.

ACca—9 to 16 inches; dark gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) moist; weak medium and coarse subangular blocky structure parting to weak fine granular; slightly hard, friable, slightly sticky and slightly plastic; violent effervescence; moderately alkaline; gradual wavy boundary.

C1ca—16 to 22 inches; gray (10YR 6/1) clay loam, dark gray (10YR 4/1) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; violent effervescence; moderately alkaline; clear smooth boundary.

C2gca—22 to 39 inches; gray (5Y 6/1) sandy clay loam, gray (5Y 5/1) moist; common medium distinct olive brown (2.5Y 4/4) and few fine faint gray (10YR 5/1) mottles; massive; hard, firm, slightly sticky and slightly plastic; violent effervescence; moderately alkaline; gradual wavy boundary.

IIC3ca—39 to 60 inches; light gray (2.5Y 7/2) gravelly loamy sand, grayish brown (2.5Y 5/2) moist; single grain; loose; few small chips of shale; pebbles and sand grains coated with calcium carbonate; violent effervescence; moderately alkaline.

The thickness of the mollic epipedon ranges from 7 to 16 inches. The depth to gravelly material ranges from 30 to 40 inches. The calcium carbonate equivalent is 20 to 30 percent. Reaction is mildly alkaline or moderately alkaline throughout the profile.

The A horizon has hue of 10YR, value of 4 or 5 (2 or 3 moist), and chroma of 1 or less. It dominantly is loam but in some pedons is clay loam or silt loam.

The Cca horizon has hue of 10YR, 2.5Y, or 5Y, value of 6 to 8 (4 to 6 moist), and chroma of 1 or less. It is clay loam, loam, or sandy clay loam. The IIC horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 to 7 (4 to 6 moist), and chroma of 2 to 4. In some pedons it is sand and gravel stratified with thin layers of finer textured material.

Arlo silt loam, wet, is wetter than is defined as the range for the series. Also, it contains more clay in the

subsoil and is deeper to sand and gravel. These differences, however, do not significantly alter the use or behavior of this soil.

Beadle series

The Beadle series consists of deep, well drained soils formed in clay loam glacial till on uplands. Permeability is moderately slow. Slopes range from 0 to 9 percent.

Beadle soils commonly are near DeGrey, Eakin, Hoven, Jerauld, and Onita soils. DeGrey and Jerauld soils have a natric horizon. They are in slight depressions. Eakin soils are in positions on the landscape similar to those of the Beadle soils. Their subsoil contains less clay, more silt, and less sand than that of the Beadle soils. The poorly drained Hoven soils are in depressions. The moderately well drained Onita soils are in swales. They have a mollic epipedon that is more than 20 inches thick.

Typical pedon of Beadle loam, in an area of Beadle-Eakin complex, 6 to 9 percent slopes, 265 feet north and 2,350 feet east of the southwest corner of sec. 2, T. 99 N., R. 70 W.

A1—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to moderate fine granular; slightly hard, friable; slightly acid; clear smooth boundary.

B21t—6 to 10 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; neutral; clear smooth boundary.

B22t—10 to 16 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; neutral; abrupt wavy boundary.

B3ca—16 to 30 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to moderate medium and fine subangular blocky; hard, firm, slightly sticky and slightly plastic; common medium accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.

C1ca—30 to 36 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; weak coarse blocky structure; hard, firm, slightly sticky and slightly plastic; common medium accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.

C2—36 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, friable, sticky and plastic; few fragments of shale; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 20 to 40 inches. The depth to free carbonates ranges from 12 to 25 inches. The mollic epipedon is 10 to 20 inches thick.

The A horizon has value of 3 or 4 (2 or 3 moist) and chroma of 1 or 2. It is 6 to 10 inches thick. It dominantly is loam but in some pedons is silt loam. It is slightly acid or neutral. The B2t horizon has hue of 10YR or 2.5Y, value of 4 or 5 (3 or 4 moist), and chroma of 2 or 3. It is neutral or mildly alkaline. The C horizon has hue of 10YR or 2.5Y, value of 5 or 6 (4 or 5 moist), and chroma of 2 or 3. It is mildly alkaline or moderately alkaline and has common or many accumulations of carbonate. Mottles inherited from the glacial till are in the lower part of this horizon in some pedons.

Betts series

The Betts series consists of deep, well drained soils formed in calcareous, loamy glacial till on uplands. Permeability is moderate in the subsoil and moderately slow in the underlying material. Slopes range from 9 to 40 percent.

Betts soils are similar to Ethan soils and commonly are near Clarno, Ethan, Houdek, and Sansarc soils. Clarno, Ethan, and Houdek soils have a mollic epipedon. They generally are less sloping than the Betts soils. Sansarc soils formed in clay weathered from shale. They are on breaks along the Missouri River.

Typical pedon of Betts loam, in an area of Betts-Ethan loams, 9 to 25 percent slopes, 105 feet north and 2,070 feet east of the southwest corner of sec. 17, T. 95 N., R. 62 W.

A1—0 to 3 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium platy structure parting to weak fine granular; soft, very friable; strong effervescence; mildly alkaline; clear wavy boundary.

B2—3 to 9 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; strong effervescence; mildly alkaline; gradual wavy boundary.

C1ca—9 to 25 inches; pale yellow (2.5Y 7/4) clay loam, olive brown (2.5Y 4/4) moist; common fine distinct light gray (5Y 7/1) and yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.

C2—25 to 43 inches; pale yellow (2.5Y 7/4) clay loam, olive brown (2.5Y 4/4) moist; common fine distinct light gray (5Y 7/1) and yellowish brown (10YR 5/6) mottles; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.

C3—43 to 60 inches; pale yellow (2.5Y 7/4) clay loam, olive brown (2.5Y 4/4) moist; common fine distinct light gray (5Y 7/1) and yellowish brown (10YR 5/6) mottles; massive; hard, firm, slightly sticky and slightly plastic; few fine nests of gypsum crystals; few fine accumulations of carbonate; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 6 to 10 inches. Pebbles are throughout the profile and make up 5 to 10 percent of the volume.

The A horizon has value of 3 or 4 (2 or 3 moist) and chroma of 1 or 2. It is 2 to 5 inches thick. The B2 and C horizons are mildly alkaline or moderately alkaline. The B2 horizon has value of 5 or 6 (4 or 5 moist) and chroma of 2 or 3. It is clay loam or loam. The C horizon has hue of 10YR or 2.5Y, value of 5 to 7 (4 or 5 moist), and chroma of 2 to 4. It is clay loam or loam. The mottles in this horizon are inherited from the parent material.

Bon series

The Bon series consists of deep, moderately well drained soils formed in alluvium on terraces and flood plains. Permeability is moderate. Slopes range from 0 to 2 percent.

Bon soils commonly are near Betts, Eakin, Ethan, and Onita soils. Betts, Eakin, and Ethan soils are in the steeper areas on uplands. Betts soils do not have a mollic epipedon, and Eakin and Ethan soils are dark to a depth of less than 20 inches. Onita soils contain more clay in the subsoil than the Bon soils. They are in swales on uplands.

Typical pedon of Bon silt loam, channeled, 2,455 feet south and 250 feet west of the northeast corner of sec. 5, T. 96 N., R. 62 W.

A11—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; slight effervescence; neutral; clear smooth boundary.

A12—4 to 11 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; weak fine subangular blocky structure; soft, very friable; neutral; clear smooth boundary.

A13—11 to 22 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; moderate medium subangular blocky structure parting to weak fine and medium subangular blocky; soft, very friable; neutral; clear wavy boundary.

C1—22 to 32 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular structure; slightly hard, friable; strong effervescence; mildly alkaline; clear wavy boundary.

C2—32 to 46 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; massive; slightly hard, friable; strong effervescence; mildly alkaline; clear wavy boundary.

C3—46 to 54 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable; strong effervescence; mildly alkaline; clear wavy boundary.

C4—54 to 60 inches; gray (10YR 6/1) loam, gray (10YR 5/1) moist; common fine faint and distinct yellowish brown (10YR 5/6) mottles; massive; hard, friable; strong effervescence; mildly alkaline.

The thickness of the mollic epipedon ranges from 20 to 40 inches. Some pedons have a buried A horizon.

The A horizon has hue of 10YR, value of 3 to 5 (2 to 4 moist), and chroma of 1 to 3. It dominantly is silt loam but in some pedons is loam or very fine sandy loam. It ranges from neutral to moderately alkaline. Some pedons have a B2 horizon. The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 3 to 7 (2 to 5 moist), and chroma of 1 to 3. It is mildly alkaline or moderately alkaline. In some pedons it is not mottled.

Boyd series

The Boyd series consists of moderately deep, well drained soils formed in residuum of clayey shale on uplands. Permeability is slow. Slopes range from 6 to 20 percent.

Boyd soils are similar to Promise soils and commonly are near Betts, Gavins, Okaton, Promise, and Sansarc soils. Betts soils formed in clay loam glacial till. They are on the higher parts of the landscape. Gavins soils are shallow over siltstone. They are below the Boyd soil on the landscape. Okaton and Sansarc soils have shale within a depth of 20 inches. They are on the steeper, more convex parts of the landscape. Promise soils do not have shale within a depth of 40 inches.

Typical pedon of Boyd silty clay, in an area of Boyd-Sansarc complex, 6 to 15 percent slopes, 1,850 feet east and 750 feet south of the northwest corner of sec. 21, T. 96 N., R. 65 W.

Ap—0 to 5 inches; dark gray (10YR 4/1) silty clay, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to moderate fine granular; very hard, very firm, very sticky and very plastic; slight effervescence; mildly alkaline; abrupt smooth boundary.

B21—5 to 13 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; very hard, very firm, very sticky and very plastic; slight effervescence; mildly alkaline; clear wavy boundary.

B22—13 to 23 inches; dark gray (10YR 4/1) clay, dark grayish brown (10YR 4/2) moist; weak coarse blocky structure; extremely hard, extremely firm, very sticky and very plastic; few fine accumulations of carbonate; strong effervescence; mildly alkaline; clear wavy boundary.

C1—23 to 27 inches; dark gray (10YR 4/1) clay, dark grayish brown (2.5Y 4/2) moist; weak coarse and medium blocky structure; extremely hard, extremely firm, very sticky and very plastic; few fragments of shale; few fine gypsum crystals; strong effervescence; neutral; clear wavy boundary.
C2—27 to 31 inches; grayish brown (2.5Y 5/2) shaly clay, olive gray (5Y 4/2) moist; common medium faint olive brown (2.5Y 4/4) mottles; weak coarse blocky structure parting to moderate medium platy; very hard, very firm, very sticky and very plastic; few fine accumulations of carbonate in seams in the shale; slight effervescence; neutral; clear wavy boundary.
Cr—31 to 60 inches; gray (5Y 5/1) shale, olive gray (5Y 4/2) moist; common medium faint olive brown (2.5Y 4/4) mottles; brittle; many fine accumulations of carbonate in cracks and seams in the shale; slight effervescence; neutral.

The thickness of the solum ranges from 20 to 32 inches. The depth to shale ranges from 25 to 35 inches. Reaction is neutral to moderately alkaline throughout the profile.

The A horizon has value of 4 or 5 (2 or 3 moist) and chroma of 1 or 2. It is 5 to 7 inches thick. The B2 horizon has value of 4 or 5 (3 or 4 moist) and chroma of 1 to 3. The C horizon has value of 4 to 6 (4 or 5 moist) and chroma of 1 to 3.

Chancellor series

The Chancellor series consists of deep, poorly drained soils formed in silty and clayey alluvium in swales on uplands. Permeability is slow. Slopes range from 0 to 2 percent.

Chancellor soils commonly are near Davison, Ethan, Homme, Onita, and Tetonka soils. Davison soils have a calcic horizon. They are in areas between the Chancellor soils and the well drained soils on uplands. The well drained Ethan and Homme soils are on the higher parts of the landscape. The moderately well drained Onita soils are in positions on the landscape similar to those of the Chancellor soils. Tetonka soils are in depressions. They have an A2 horizon.

Typical pedon of Chancellor silty clay loam, in an area of Tetonka-Chancellor silty clay loams, 820 feet east and 1,220 feet south of the northwest corner of sec. 1, T. 95 N., R. 62 W.

Ap—0 to 7 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; weak fine and medium subangular blocky structure; slightly hard, friable; neutral; clear smooth boundary.
A12—7 to 15 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; weak fine subangular blocky structure parting to weak fine granular; hard, friable; neutral; clear smooth boundary.
B21t—15 to 23 inches; very dark gray (5Y 3/1) silty clay, black (2.5Y 2/1) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; shiny coatings on faces of peds; very hard, firm, sticky and plastic; neutral; gradual wavy boundary.
B22tg—23 to 32 inches; olive gray (5Y 4/2) silty clay, very dark gray (5Y 3/1) and dark olive gray (5Y 3/2) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; very hard, firm, sticky and plastic; shiny coatings on faces of peds; neutral; gradual wavy boundary.
B3ca—32 to 36 inches; olive gray (5Y 5/2) and olive (5Y 5/3) silty clay, olive gray (5Y 4/2) moist; weak medium and coarse prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; common medium accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.
C1gca—36 to 45 inches; light olive gray (5Y 6/2) silty clay loam, olive gray (5Y 5/2) moist; common fine distinct olive yellow (2.5Y 6/6) mottles; massive; very hard, firm, sticky and plastic; common fine distinct accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.
C2gca—45 to 60 inches; pale olive (5Y 6/3) silty clay loam, olive (5Y 4/3) moist; many fine distinct light olive brown (2.5Y 5/6) mottles; massive; hard, firm, slightly sticky and slightly plastic; strong effervescence; mildly alkaline.

The thickness of the solum and the depth to free carbonates range from 30 to 44 inches. The thickness of the mollic epipedon ranges from 24 to 36 inches.

The A horizon has value of 3 or 4 (2 or 3 moist) and chroma of 1 or less. The B2t horizon is silty clay or silty clay loam. It is neutral or mildly alkaline. The C horizon has hue of 2.5Y or 5Y. It is silty clay loam or clay loam. It is mildly alkaline or moderately alkaline.

Clarno series

The Clarno series consists of deep, well drained soils formed in loamy glacial till on uplands. Permeability is moderate in the subsoil and moderately slow in the underlying material. Slopes range from 2 to 15 percent.

Clarno soils are similar to Ethan, Hand, and Houdek soils and commonly are near Betts, Ethan, Prosper, and Tetonka soils. Betts and Ethan soils are on knolls and ridges. Betts soils do not have a mollic epipedon. Ethan soils have free carbonates within a depth of 10 inches. Hand soils are stratified in the underlying material. Houdek soils have an argillic horizon. The moderately well drained Prosper soils are in swales. The poorly drained Tetonka soils are in depressions.

Typical pedon of Clarno loam, in an area of Clarno-Ethan loams, 2 to 6 percent slopes, 200 feet east and

1,900 feet south of the northwest corner of sec. 14, T. 97 N., R. 63 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to weak medium granular; slightly hard, very friable; neutral; abrupt smooth boundary.
B2—7 to 14 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; hard, friable; neutral; abrupt wavy boundary.
B3ca—14 to 24 inches; light brownish gray (2.5Y 6/2) loam, light olive brown (2.5Y 5/4) moist; faces of peds are dark grayish brown (10YR 4/2) when moist; weak coarse subangular blocky structure parting to weak medium subangular blocky; hard, friable; few fine accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.
C1ca—24 to 35 inches; light brownish gray (2.5Y 6/2) loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, friable; few fine accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.
C2—35 to 60 inches; light brownish gray (2.5Y 6/2) loam, light olive brown (2.5Y 5/4) moist; few fine distinct gray (2.5Y 6/1) mottles; massive; slightly hard, friable; slight effervescence; mildly alkaline.

The thickness of the solum ranges from 20 to 36 inches. The depth to free carbonates ranges from 12 to 20 inches. The mollic epipedon ranges from 8 to 18 inches in thickness.

The A horizon has value of 3 or 4 (2 or 3 moist) and chroma of 1 or 2. It is 6 to 10 inches thick. It is slightly acid or neutral. It dominantly is loam but in some pedons is silt loam. The B2 horizon has hue of 10YR or 2.5Y, value of 4 or 5 (3 or 4 moist), and chroma of 2 or 3. It is loam or clay loam. It is neutral or mildly alkaline. The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 to 7 (5 or 6 moist), and chroma of 2 to 4. It is loam or clay loam. It is mildly alkaline or moderately alkaline.

Davison series

The Davison series consists of deep, moderately well drained soils formed in loamy glacial drift near the edges of swales, drainageways, and depressions. Permeability is moderate. Slopes range from 0 to 3 percent.

Davison soils commonly are near Chancellor, Homme, Onita, and Tetonka soils. The poorly drained Chancellor soils are in swales. The well drained Homme soils are on uplands. Onita soils are deeper to carbonates than the Davison soils. They are in swales. The poorly drained Tetonka soils are in depressions.

Typical pedon of Davison loam, in an area of Onita-Davison complex, 1,530 feet west and 280 feet north of the southeast corner of sec. 26, T. 95 N., R. 62 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure parting to weak fine granular; soft, friable; strong effervescence; mildly alkaline; abrupt smooth boundary.
AC—7 to 12 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable; strong effervescence; mildly alkaline; clear smooth boundary.
C1ca—12 to 25 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; few fine faint gray (10YR 6/1) mottles; weak medium subangular blocky structure; slightly hard, friable; common medium distinct accumulations of carbonate; violent effervescence; moderately alkaline; gradual wavy boundary.
C2ca—25 to 31 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; few fine faint gray (10YR 6/1) mottles; weak medium subangular blocky structure; slightly hard, friable; common fine distinct accumulations of carbonate; violent effervescence; moderately alkaline; gradual wavy boundary.
C3—31 to 42 inches; light yellowish brown (2.5Y 6/4) clay loam, light olive brown (2.5Y 5/4) moist; common fine distinct gray (10YR 6/1) and few fine distinct yellowish brown (10YR 5/6) mottles; massive; slightly hard, friable; few fine accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.
C4—42 to 60 inches; pale yellow (2.5Y 7/4) clay loam, light olive brown (2.5Y 5/4) moist; common medium distinct gray (10YR 6/1) and common fine distinct yellowish brown (10YR 5/6) mottles; massive; slightly hard, friable; few medium nests of gypsum; strong effervescence; mildly alkaline.

The thickness of the mollic epipedon ranges from 7 to 12 inches. Typically, free carbonates are at the surface, but some pedons in areas that support native grass are leached to a depth of 6 inches.

The A horizon has value of 3 to 5 (2 or 3 moist) and chroma of 1 or 2. It dominantly is loam but in some pedons is silt loam. It is mildly or moderately alkaline. Some pedons do not have an AC horizon. The C horizon has hue of 2.5Y or 5Y, value of 5 to 7 (4 to 6 moist), and chroma of 1 to 4. It is clay loam or loam. It has few to many, faint to prominent mottles. Some pedons do not have gypsum crystals.

DeGrey series

The DeGrey series consists of deep, moderately well drained soils formed in silty and clayey material over clay loam glacial till on uplands. Permeability is slow. Slopes range from 0 to 4 percent.

DeGrey soils are similar to Walke soils and commonly are near Eakin, Highmore, Hoven, Jerauld, and Onita soils. Walke soils do not have columnar structure in the B2t horizon. Eakin, Highmore, and Onita soils do not have a natric horizon. Eakin and Highmore soils are higher on the landscape than the DeGrey soils, and Onita soils are in swales. The poorly drained Hoven soils are in depressions. Jerauld soils have visible salts within a depth of 16 inches. They generally are in slight depressions.

Typical pedon of DeGrey silt loam, in an area of DeGrey-Jerauld silt loams, 1,750 feet east and 255 feet south of the northwest corner of sec. 29, T. 99 N., R. 67 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure parting to weak fine granular; slightly hard, friable; slightly acid; clear smooth boundary.

A2—6 to 8 inches; grayish brown (10YR 5/2) silt loam, very dark gray (10YR 3/1) moist; weak thin and medium platy structure; soft, friable; neutral; abrupt smooth boundary.

B21t—8 to 11 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate medium columnar structure parting to moderate fine blocky; very hard, very firm, sticky and plastic; neutral; clear smooth boundary.

B22t—11 to 17 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to strong fine and medium subangular blocky; very hard, very firm, sticky and plastic; moderately alkaline; clear smooth boundary.

B3ca—17 to 24 inches; light olive brown (2.5Y 5/4) silty clay loam, olive brown (2.5Y 4/4) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; very hard, very firm, sticky and plastic; few fine accumulations of carbonate; strong effervescence; moderately alkaline; clear smooth boundary.

C1ca—24 to 31 inches; light olive brown (2.5Y 5/4) silty clay loam, olive brown (2.5Y 4/4) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine nests of gypsum and threads of salts; common fine accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.

IICcs—31 to 60 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, slightly sticky and slightly plastic; common fine and medium nests of gypsum; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 15 to 30 inches. The depth to free carbonates ranges from 12 to 24 inches. The depth to clay loam glacial till ranges from 20 to more than 40 inches.

The Ap or A1 horizon has value of 4 or 5 (2 or 3 moist) and chroma of 1 or 2. It is slightly acid or neutral. The A2 horizon has value of 5 or 6 (3 or 4 moist) and chroma of 1 or 2. It is slightly acid or neutral. In most cultivated areas the Ap and A2 horizons are mixed.

The B2t horizon has hue of 10YR or 2.5Y, value of 4 or 5 (3 or 4 moist), and chroma of 1 or 2. It is silty clay or silty clay loam. It ranges from neutral to moderately alkaline.

The Cca horizon has hue of 10YR or 2.5Y, value of 5 or 6 (4 or 5 moist), and chroma of 2 to 4. It is silty clay or silty clay loam. It is mildly alkaline or moderately alkaline. It has few to many, fine and medium accumulations of calcium carbonate. The IIC horizon has hue of 2.5Y or 5Y, value of 5 to 7 (4 to 6 moist), and chroma of 2 to 4. It is clay loam or loam. It is moderately alkaline or strongly alkaline.

Delmont series

The Delmont series consists of somewhat excessively drained soils that are shallow over gravelly sand. These soils formed in loamy alluvium over gravelly sand. They are on outwash plains and terraces. Permeability is moderate in the solum and rapid in the underlying material. Slopes range from 2 to 9 percent.

Delmont soils are similar to Enet and Talmo soils and commonly are near Arlo, Durrstein, Eakin, Enet, and Talmo soils. The poorly drained and very poorly drained Arlo soils are in deep swales. Durrstein soils formed in clayey alluvium on flood plains. They have a natric horizon. Eakin soils are not underlain by gravelly sand. They are on uplands. Enet soils are deeper to gravelly material than the Delmont soils. Talmo soils are shallower to gravelly material than the Delmont soils.

Typical pedon of Delmont loam, in an area of Delmont-Talmo complex, 2 to 9 percent slopes, 1,750 feet east and 100 feet south of the northwest corner of sec. 12, T. 100 N., R. 67 W.

A1—0 to 5 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure parting to weak fine granular; soft, very friable; neutral; abrupt smooth boundary.

B2—5 to 14 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; soft, very friable; neutral; abrupt wavy boundary.

B3ca—14 to 17 inches; dark brown (10YR 4/3) gravelly loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, very friable; strong effervescence; mildly alkaline; clear wavy boundary.

IIC1ca—17 to 21 inches; multicolored gravelly sand; single grain; loose; strong effervescence; mildly alkaline; gradual wavy boundary.
IIC2—21 to 60 inches; multicolored gravelly sand; single grain; loose; slight effervescence; mildly alkaline.

The thickness of the solum, the depth to gravelly material (fig. 9), and the depth to free carbonates range from 14 to 20 inches. The thickness of the mollic epipedon ranges from 10 to 20 inches.

The A horizon has value of 3 or 4 (2 or 3 moist) and chroma of 1 or 2. It is slightly acid or neutral and is 4 to 7 inches thick. The B2 horizon has value of 3 or 4 (2 or 3 moist) and chroma of 1 or 2. It is neutral or mildly alkaline. The IIC horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 to 7 (4 or 5 moist), and chroma of 2 to 4. The sand is medium or coarse, and the gravel content ranges from 20 to more than 50 percent.

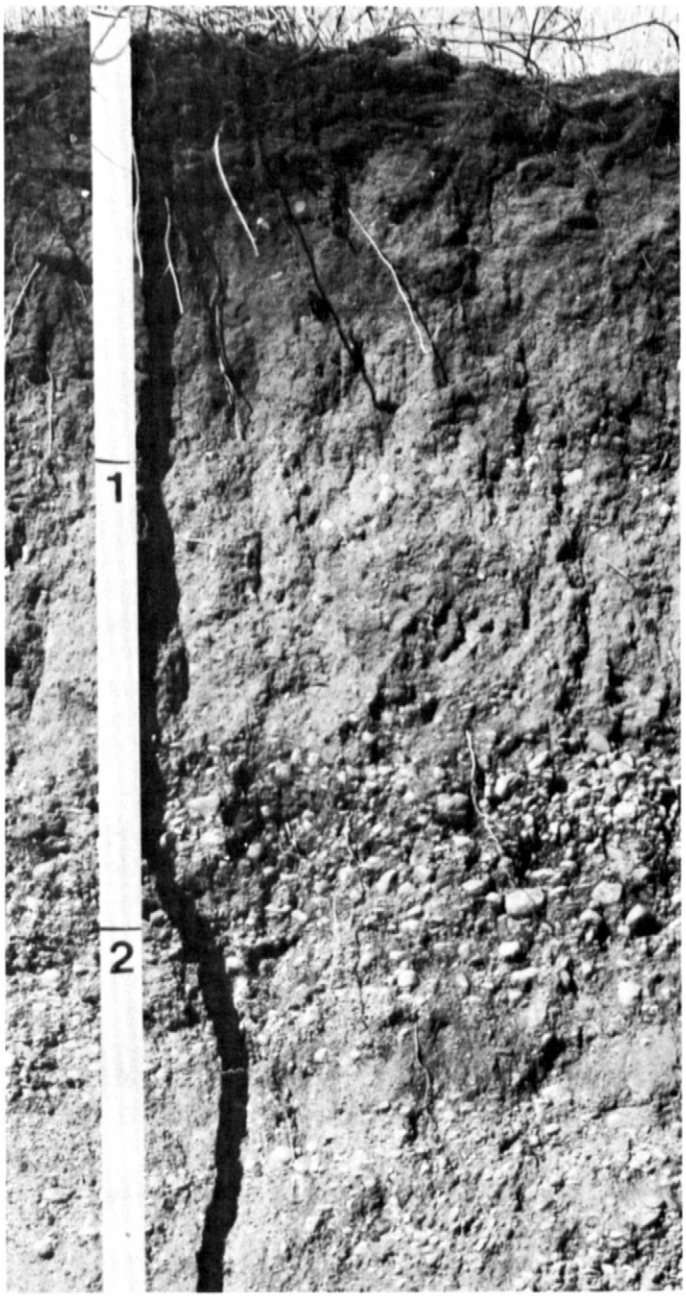

Figure 9.—Profile of Delmont loam, in an area of Enet-Delmont loams, 2 to 9 percent slopes. Gravelly sand is at a depth of about 18 inches. Depth is marked in feet.

Dorna series

The Dorna series consists of deep, well drained soils formed in silty material over clayey sediments on uplands. Permeability is moderate in the silty material and slow in the underlying silty clay. Slopes range from 0 to 4 percent.

Dorna soils are similar to Lowry soils and commonly are near Lowry, Promise, and Sansarc soils. Lowry soils do not have clay within a depth of 40 inches. Promise soils are clayey throughout. They are on alluvial fans and foot slopes. The clayey Sansarc soils are shallow to shale. They are on breaks along the Missouri River.

Typical pedon of Dorna silt loam, 0 to 4 percent slopes, 250 feet south and 975 feet west of the northeast corner of sec. 19, T. 100 N., R. 71 W.

A11—0 to 8 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; soft, very friable; neutral; clear smooth boundary.
A12—8 to 15 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure; soft, very friable; strong effervescence; mildly alkaline; gradual smooth boundary.
C1—15 to 21 inches; pale brown (10YR 6/3) silt loam, dark brown (10YR 4/3) moist; weak coarse prismatic structure; slightly hard, very friable; few chips of shale; few fine accumulations of carbonate; strong effervescence; mildly alkaline; gradual smooth boundary.
IIC2ca—21 to 28 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; many medium accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.
IIC3—28 to 60 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; common fine and medium accumulations of carbonate; few fine threads of salts in the lower part; slight effervescence; moderately alkaline.

The depth to clayey material ranges from 20 to 40 inches. Some pedons have a buried A horizon. The depth to free carbonates is 0 to 10 inches.

The A horizon has value of 3 to 5 (2 or 3 moist) and chroma of 2. The C1 horizon has value of 5 or 6 (4 or 5 moist) and chroma of 2 or 3. The IIC horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 or 6 (4 or 5 moist), and chroma of 2 or 3. It is silty clay or clay.

Durrstein series

The Durrstein series consists of deep, poorly drained soils formed in clayey alluvium on flood plains. Permeability is slow. Slopes range from 0 to 2 percent.

The Durrstein soils in this county have a seasonal high water table at a greater depth than is defined as the range for the series. Also, they are flooded less often. These differences, however, do not significantly alter the use or behavior of the soils.

Durrstein soils are similar to Hoven and Napa soils and commonly are near DeGrey, Delmont, Eakin, Hoven, and Talmo soils. Hoven soils are in depressions in the uplands. Their subsoil is thicker than that of the Durrstein soils. Napa soils have a mollic epipedon that is thicker than that of the Durrstein soils. The moderately well drained DeGrey soils and the well drained Eakin soils are on uplands. Delmont and Talmo soils are underlain by gravelly sand. They are on terraces and outwash plains.

Typical pedon of Durrstein silt loam, 1,900 feet south and 320 feet east of the northwest corner of sec. 15, T. 100 N., R. 67 W.

A2—0 to 1 inch; gray (10YR 6/1) silt loam, dark gray (10YR 4/1) moist; weak very thin and thin platy structure; soft, very friable; slightly acid; abrupt smooth boundary.

B21t—1 to 6 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; moderate medium and fine columnar structure parting to moderate medium and fine subangular blocky; very hard, firm, sticky; neutral; clear wavy boundary.

B22tcssa—6 to 11 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; weak medium and coarse prismatic structure parting to moderate coarse, medium, and fine subangular blocky; very hard, firm, very sticky; common fine nests of gypsum; common fine threads of salts; mildly alkaline; clear wavy boundary.

B3cs—11 to 16 inches; gray (10YR 5/1) silty clay, very dark gray (10YR 3/1) moist; weak medium and coarse prismatic structure parting to moderate fine and very fine subangular blocky; hard, firm, very sticky; common fine accumulations of carbonate; common fine nests of gypsum; slight effervescence; strongly alkaline; clear wavy boundary.

C1cacs—16 to 36 inches; gray (5Y 5/1) silty clay, dark gray (5Y 4/1) moist; moderate medium and coarse prismatic structure parting to moderate medium and fine subangular blocky; hard, firm, very sticky; many fine and few medium accumulations of carbonate; common fine and few medium nests of gypsum; slight effervescence; mildly alkaline; gradual wavy boundary.

C2—36 to 60 inches; gray (5Y 5/1) silty clay, dark gray (5Y 4/1) moist; weak coarse prismatic structure parting to weak medium subangular blocky; hard, firm, very sticky; common fine accumulations of carbonate; common fine and few coarse nests of gypsum; slight effervescence; mildly alkaline.

The solum ranges from 10 to 20 inches in thickness. The depth to visible salts ranges from 5 to 15 inches. Some pedons have an A1 horizon, which is less than 2 inches thick.

The A2 horizon has hue of 10YR, value of 5 or 6 (3 or 4 moist), and chroma of 1 or 2. It is slightly acid or neutral. The B2t horizon has hue of 10YR, value of 4 or 5 (2 or 3 moist), and chroma of 1 or 2. It ranges from neutral to moderately alkaline. The C horizon has value of 5 to 7 (3 to 5 moist) and chroma of 1 or 2. It is mildly alkaline to strongly alkaline.

Eakin series

The Eakin series consists of deep, well drained soils formed in silty material over clay loam glacial till on uplands. Permeability is moderate in the subsoil and moderately slow in the underlying material. Slopes range from 0 to 9 percent.

Eakin soils are similar to Agar, Highmore, and Homme soils and commonly are near DeGrey, Ethan, Highmore, Onita, and Tetonka soils. Agar and Highmore soils have glacial till below a depth of 40 inches. Homme soils do not have an argillic horizon. DeGrey soils have a natric horizon. They are on small flats or in slightly concave areas. Ethan soils contain more sand and less silt in the subsoil than the Eakin soils. They are on convex ridges and knolls. The moderately well drained Onita soils are in swales. The poorly drained Tetonka soils are in depressions.

Typical pedon of Eakin silt loam, in an area of Highmore-Eakin silt loams, 2 to 6 percent slopes, 200 feet south and 2,300 feet west of the northeast corner of sec. 31, T. 97 N., R. 63 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky and moderate medium granular structure; hard, very friable; neutral; abrupt smooth boundary.

B2t—7 to 16 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; shiny coatings on faces of peds; neutral; abrupt wavy boundary.

B3ca—16 to 29 inches; light olive brown (2.5Y 5/4) silty clay loam, olive brown (2.5Y 4/4) moist; weak coarse and medium blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.
IIC1ca—29 to 36 inches; pale olive (5Y 6/3) clay loam, olive (5Y 5/3) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.
IIC2—36 to 60 inches; pale olive (5Y 6/4) clay loam, olive (5Y 5/4) moist; common medium distinct gray (5Y 5/1) and yellowish brown (10YR 5/8) mottles; massive; hard, firm, sticky and plastic; few fragments of shale and chalk; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 19 to 35 inches. The depth to free carbonates ranges from 10 to 18 inches. The mollic epipedon is 7 to 18 inches thick. The depth to glacial till ranges from 20 to 40 inches.

The A horizon has value of 4 or 5 (2 or 3 moist) and chroma of 1 or 2. It is 5 to 8 inches thick. It is slightly acid or neutral. The B2t horizon has hue of 10YR or 2.5Y, value of 4 or 5 (2 to 4 moist), and chroma of 2 or 3. The IIC horizon has hue of 2.5Y or 5Y, value of 5 to 7 (4 to 6 moist), and chroma of 2 to 4. The mottles in the lower part of this horizon are inherited from the parent material.

Enet series

The Enet series consists of well drained soils that are moderately deep over sand and gravel. These soils formed in glacial outwash or alluvial sediments on uplands and terraces. Permeability is moderate in the subsoil and rapid in the underlying material. Slopes range from 0 to 9 percent.

Enet soils are similar to Delmont soils and commonly are near Arlo, Delmont, Prosper, and Talmo soils. The very poorly drained and poorly drained Arlo soils are in swales. Delmont soils are 14 to 20 inches deep to gravelly sand. The moderately well drained Prosper soils are in swales. They are not underlain by gravelly sand. Talmo soils are less than 14 inches deep over gravelly sand. They are on high ridges and knolls.

Typical pedon of Enet loam, 0 to 2 percent slopes, 210 feet south and 220 feet east of the northwest corner of sec. 11, T. 97 N., R. 63 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; weak medium granular structure; soft, very friable; slightly acid; abrupt smooth boundary.
B2—7 to 26 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate coarse and medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable; neutral; clear wavy boundary.
B3ca—26 to 30 inches; grayish brown (10YR 5/2) sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable; common fine accumulations of carbonate; strong effervescence; mildly alkaline; clear wavy boundary.
IIC1ca—30 to 38 inches; very pale brown (10YR 7/3) gravelly loamy sand, brown (10YR 5/3) moist; single grain; loose; carbonate coatings on pebbles; strong effervescence; mildly alkaline; clear wavy boundary.
IIC2—38 to 60 inches; multicolored gravelly sand; single grain; loose; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 22 to 35 inches. The thickness of the mollic epipedon and the depth to free carbonates range from 20 to 35 inches. The depth to gravelly loamy sand and gravelly sand ranges from 22 to 35 inches.

The A horizon has value of 3 or 4 (2 or 3 moist) and chroma of 1 or 2. It is slightly acid or neutral. It is 6 to 8 inches thick. It dominantly is loam but in some pedons is silt loam. The B horizon has value of 4 or 5 (2 or 3 moist) and chroma of 2 or 3. The IIC horizon is mildly alkaline or moderately alkaline.

Ethan series

The Ethan series consists of deep, well drained soils formed in loamy glacial till on uplands. Permeability is moderate in the solum and moderately slow in the underlying material. Slopes range from 2 to 25 percent.

Ethan soils are similar to Betts and Clarno soils and commonly are near those soils and Eakin, Highmore, Homme, and Houdek soils. Betts soils do not have a mollic epipedon. They are on the steeper parts of the landscape. Clarno and Homme soils are deeper to carbonates than the Ethan soil. Eakin, Highmore, and Houdek soils have an argillic horizon. They are on the smoother parts of the landscape.

Typical pedon of Ethan loam, in an area of Eakin-Ethan complex, 2 to 6 percent slopes, 66 feet south and 360 feet west of the northeast corner of sec. 32, T. 96 N., R. 62 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, friable; slight effervescence; mildly alkaline; abrupt smooth boundary.
B2—6 to 10 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium and coarse prismatic structure parting to weak medium and fine subangular blocky; hard, friable; slight effervescence; mildly alkaline; clear smooth boundary.
B3ca—10 to 21 inches; light gray (2.5Y 7/2) loam, light brownish gray (2.5Y 6/2) moist; weak medium

prismatic structure parting to moderate fine and medium subangular blocky; hard, friable; very firm; strong effervescence; moderately alkaline; clear wavy boundary.

C1ca—21 to 46 inches; light gray (2.5Y 7/2) clay loam, light brownish gray (2.5Y 6/2) moist; massive; slightly hard, friable; strong effervescence; moderately alkaline; gradual wavy boundary.

C2—46 to 60 inches; light gray (2.5Y 7/2) clay loam, light brownish gray (2.5Y 6/2) moist; massive; slightly hard, friable; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 12 to 30 inches. The depth to free carbonates is 0 to 9 inches. The thickness of the mollic epipedon is 7 to 10 inches.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5 (2 or 3 moist), and chroma of 1 or 2. It ranges from slightly acid to mildly alkaline. The B2 horizon has hue of 10YR or 2.5Y, value of 4 or 5 (3 or 4 moist), and chroma of 2 or 3. It is loam or clay loam. It is neutral or mildly alkaline. The C horizon has hue of 2.5Y or 5Y, value of 5 to 8 (4 to 6 moist), and chroma of 2 to 4. It is loam or clay loam. It is mildly alkaline or moderately alkaline.

Gavins series

The Gavins series consists of shallow, well drained soils formed in residuum of siltstone on uplands. Permeability is moderate above the siltstone. Slopes range from 9 to 40 percent.

Gavins soils are similar to Okaton soils and commonly are near Boyd, Lowry, Promise, Sansarc, and Sully soils. Boyd soils are moderately deep over shale. They are higher on the landscape than the Gavins soils. The deep Lowry and Sully soils formed in loess. Lowry soils have a mollic epipedon. They are on the less sloping uplands. Okaton and Sansarc soils contain more clay than the Gavins soils and have shale within a depth of 20 inches. Okaton, Sansarc, and Sully soils are in positions on the landscape similar to those of the Gavins soils. Promise soils contain more clay than the Gavins soils, have a mollic epipedon, and are more than 40 inches deep over bedrock. They are on foot slopes and fans on the lower parts of the landscape.

Typical pedon of Gavins silt loam, in an area of Lowry-Gavins silt loams, 6 to 40 percent slopes, 800 feet south and 2,060 feet east of the northwest corner of sec. 28, T. 94 N., R. 64 W.

A1—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak fine granular; soft, very friable; strong effervescence; neutral; clear smooth boundary.

AC—5 to 12 inches; brown (10YR 5/3) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; soft, very friable; strong effervescence; neutral; clear wavy boundary.

C—12 to 17 inches; very pale brown (10YR 7/3) loam, light yellowish brown (10YR 6/4) moist; massive; slightly hard, friable; many fine and medium fragments of siltstone; violent effervescence; neutral; gradual wavy boundary.

Cr—17 to 60 inches; very pale brown (10YR 8/4) and reddish yellow (7.5YR 7/6) siltstone, very pale brown (10YR 7/4) and reddish yellow (7.5YR 6/6) moist; accumulations of gypsum between bedding planes; very hard, firm; violent effervescence; neutral.

The depth to siltstone ranges from 10 to 20 inches. Fragments of siltstone are throughout the solum and increase in number with increasing depth. Reaction is neutral or mildly alkaline throughout the profile.

The A horizon has value of 4 or 5 (2 or 3 moist) and chroma of 1 to 2. It is silt loam or loam. The C horizon has value of 5 to 8 (5 to 7 moist) and chroma of 3 to 5. The Cr horizon has hue of 7.5YR or 10YR, value of 7 or 8 (6 or 7 moist), and chroma of 4 to 6. The bedrock plates range from 1/2 inch to several feet in thickness.

Graceville series

The Graceville series consists of deep, well drained soils formed in silty alluvium over gravelly sand on terraces. Permeability is moderate in the subsoil and rapid in the underlying gravelly sand. Slopes range from 0 to 2 percent.

Graceville soils are similar to Enet and Homme soils and commonly are near Bon, Delmont, Enet, Homme, and Lane soils. Bon soils formed in loamy alluvium on flood plains. Delmont soils have gravelly sand within a depth of 20 inches. They are on ridges. Enet soils are 20 to 40 inches deep over gravelly sand. They are on slight rises. Homme soils formed in silty drift over clay loam glacial till. They are on uplands. Lane soils are 8 to 20 inches deep to free carbonates and contain more clay in the subsoil than the Graceville soils. They are on foot slopes.

Typical pedon of Graceville silt loam, 2,800 feet east and 300 feet south of the northwest corner of sec. 36, T. 94 N., R. 62 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, black (10YR 2/1) moist; weak fine granular structure; slightly hard, friable; neutral; abrupt smooth boundary.

A12—7 to 19 inches; very dark grayish brown (10YR 3/2) silt loam, very dark brown (10YR 2/2) moist; weak fine and medium subangular blocky structure parting to weak fine granular; slightly hard, friable; slightly acid; clear smooth boundary.

B1—19 to 26 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable; slightly acid; clear smooth boundary.

B21—26 to 38 inches; dark brown (10YR 4/3) silty clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; hard, firm; slightly acid; gradual wavy boundary.
B22—38 to 54 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) moist; moderate medium and coarse prismatic structure parting to medium subangular blocky; hard, firm; slightly acid; abrupt smooth boundary.
IIC—54 to 60 inches; brown (10YR 5/3) gravelly sand, dark brown (10YR 4/3) moist; single grain; loose; slight effervescence; mildly alkaline.

The thickness of the solum, or the depth to gravelly sand, ranges from 40 to 60 inches. The thickness of the mollic epipedon ranges from 25 to 40 inches.

The A horizon has hue of 10YR, value of 3 or 4 (2 or 3 moist), and chroma of 1 or 2. It is silty clay loam or silt loam. It is slightly acid or neutral. The B2 horizon has hue of 10YR, value of 4 or 5 (3 or 4 moist), and chroma of 2 or 3. It is slightly acid or neutral. Some pedons have B3ca and Cca horizons. The IIC horizon is neutral or mildly alkaline.

Hand series

The Hand series consists of deep, well drained soils formed in loamy melt water deposits on uplands. Permeability is moderate. Slopes range from 0 to 6 percent.

Hand soils are similar to Clarno soils and commonly are near Clarno, Ethan, Henkin, Homme, Prosper, and Tetonka soils. Clarno soils formed in glacial till. Ethan soils are not so deep to free carbonates as the Hand soils. They are on convex knolls and ridges. Henkin soils contain more sand in the subsoil than the Hand soils. They are in positions on the landscape similar to those of the Hand soils. Homme soils contain more silt throughout than the Hand soils. They are on the higher parts of the landscape. The moderately well drained Prosper soils are in swales. The poorly drained Tetonka soils are in depressions.

Typical pedon of Hand loam, 0 to 2 percent slopes, 140 feet west and 2,285 feet north of the southeast corner of sec. 33, T. 97 N., R. 63 W.

Ap—0 to 5 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; weak medium granular structure; soft, very friable; neutral; abrupt smooth boundary.
A12—5 to 8 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to weak medium granular; soft, very friable; neutral; clear smooth boundary.
B2—8 to 14 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; soft, very friable; neutral; clear smooth boundary.
B3ca—14 to 25 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak coarse blocky structure parting to weak medium subangular blocky; slightly hard, friable; strong effervescence; mildly alkaline; gradual wavy boundary.
C1—25 to 48 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable; strong effervescence; moderately alkaline; gradual wavy boundary.
C2—48 to 58 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable; strong effervescence; moderately alkaline; gradual smooth boundary.
C3—58 to 60 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 20 to 38 inches. The depth to free carbonates ranges from 12 to 26 inches. The mollic epipedon ranges from 10 to 20 inches in thickness and extends into the B horizon.

The A horizon has value of 4 or 5 (2 or 3 moist) and chroma of 1 or 2. It ranges from medium acid to neutral. It is 6 to 10 inches thick. The B2 horizon has hue of 10YR or 2.5Y, value of 4 or 5 (2 or 3 moist), and chroma of 2 or 3. It is neutral or slightly acid. The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 to 7 (4 to 6 moist), and chroma of 2 to 4. In some pedons it is stratified fine sandy loam, loamy fine sand, fine sand, and clay loam.

Haynie series

The Haynie series consists of deep, well drained soils formed in silty and loamy alluvium on the flood plain along the Missouri River. Permeability is moderate. Slopes range from 0 to 2 percent.

The Haynie soils in this county receive somewhat less precipitation than is defined as the range for the series. This difference, however, does not significantly alter the use or behavior of the soils.

Haynie soils are similar to Aowa and Haynie Variant soils and commonly are near those soils and Inavale and Munjor soils. All of the adjacent soils are in positions on the landscape similar to those of the Haynie soils. Aowa soils contain more clay between depths of 10 and 40 inches than the Haynie soils. The surface layer of Haynie Variant soils is not so dark as that of the Haynie soils. Inavale and Munjor soils contain more sand in the control section than the Haynie soils.

Typical pedon of Haynie silt loam, 520 feet east and 1,180 feet north of the southwest corner of sec. 1, T. 94 N., R. 65 W.

Ap—0 to 9 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak coarse and medium subangular blocky structure parting to moderate fine subangular blocky; hard,

friable; slight effervescence; mildly alkaline; clear smooth boundary.
C—9 to 60 inches; light brownish gray (10YR 6/2) and pale brown (10YR 6/3) stratified silt loam and very fine sandy loam, grayish brown (10YR 5/2 and 2.5Y 5/2) moist; finely laminated; soft, very friable; strong effervescence; mildly alkaline.

The thickness of the solum is 8 to 10 inches and corresponds to the thickness of the A horizon. The depth to free carbonates is 0 to 9 inches. The A horizon has value of 4 or 5 (2 or 3 moist) and chroma of 2. The C horizon has hue of 10YR or 2.5Y, value of 5 or 6 (4 or 5 moist), and chroma of 2 or 3. In some pedons it has thin strata of fine sand, sandy loam, loam, or silty clay loam.

Haynie Variant

The Haynie Variant consists of deep, well drained soils formed in silty and loamy alluvium on the flood plain along the Missouri River. Permeability is moderate. Slopes range from 0 to 2 percent.

Haynie Variant soils are similar to Haynie and Munjor soils and commonly are near those soils and Albaton and Aowa soils. The poorly drained and very poorly drained Albaton soils are lower on the flood plain than the Haynie Variant. Aowa soils contain more clay between depths of 10 and 40 inches than the Haynie Variant. Also, they are slightly lower on the flood plain. Haynie and Munjor soils are in positions on the landscape similar to those of the Haynie Variant. Haynie soils have a surface layer that is darker than that of the Haynie Variant, and Munjor soils contain more sand between depths of 10 and 40 inches.

Typical pedon of Haynie Variant silt loam, 2,266 feet west and 610 feet north of the southeast corner of sec. 18, T. 94 N., R. 64 W.

Ap—0 to 7 inches; brown (10YR 5/3) silt loam, dark grayish brown (10YR 4/2) moist; weak medium granular structure parting to weak fine and very fine granular; soft, very friable; slight effervescence; mildly alkaline; clear smooth boundary.
C—7 to 60 inches; light brownish gray (2.5Y 6/2) stratified silt loam and very fine sandy loam, dark grayish brown (2.5Y 4/2) moist; moderate medium platy structure; soft, very friable; slight effervescence; mildly alkaline.

The solum, or the A horizon, is less than 10 inches thick. It has value of 5 or 6 (4 or 5 moist) and chroma of 2 or 3. It dominantly is silt loam but in some pedons is very fine sandy loam. The C horizon has hue of 10YR or 2.5Y, value of 5 or 6 (4 or 5 moist), and chroma of 2 or 3. In some pedons it has thin strata of fine sandy loam, fine sand, very fine sand, or loamy fine sand. In others it has few or common light yellowish brown and yellowish brown mottles.

Henkin series

The Henkin series consists of deep, well drained soils formed in sandy and loamy melt water deposits on uplands. Permeability is moderately rapid. Slopes range from 2 to 6 percent.

Henkin soils commonly are near Eakin, Hand, Highmore, Onita, and Prosper soils. Eakin, Hand, and Highmore soils contain more clay and less sand in the subsoil than the Henkin soils. They are in positions on the landscape similar to those of the Henkin soils. The moderately well drained Onita and Prosper soils are in swales.

Typical pedon of Henkin loam, 2 to 6 percent slopes, 390 feet west and 545 feet north of the southeast corner of sec. 33, T. 97 N., R. 63 W.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak medium and fine granular structure; soft, very friable; neutral; abrupt smooth boundary.
A12—6 to 9 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to weak medium granular; soft, very friable; neutral; abrupt smooth boundary.
B2—9 to 18 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse and medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable; neutral; abrupt wavy boundary.
B3ca—18 to 28 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, very friable; strong effervescence; mildly alkaline; gradual wavy boundary.
C1ca—28 to 48 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable; common fine accumulations of carbonate; strong effervescence; moderately alkaline; diffuse wavy boundary.
C2—48 to 60 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 4/3) moist; single grain; loose; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 22 to 35 inches. The depth to free carbonates ranges from 18 to 30 inches. The mollic epipedon ranges from 8 to 20 inches in thickness and extends into the B horizon.

The A horizon has value of 3 or 4 (2 or 3 moist) and chroma of 1 or 2. It ranges from medium acid to neutral. It dominantly is loam but in some pedons is fine sandy loam. It is 6 to 10 inches thick. The B2 horizon has hue of 10YR or 2.5Y, value of 4 or 5 (3 or 4 moist), and chroma of 2 or 3. It is slightly acid or neutral. The C horizon has hue of 10YR or 2.5Y, value of 5 to 7 (4 to 6 moist), and chroma of 2 to 4. It ranges from neutral to moderately alkaline. In some pedons clay loam glacial till is below a depth of 40 inches.

Highmore series

The Highmore series consists of deep, well drained soils formed in silty glacial drift over loamy glacial till on uplands. Permeability is moderate in the upper part of these soils and moderately slow in the lower part of the underlying material. Slopes range from 0 to 6 percent.

Highmore soils are similar to Agar, Eakin, and Homme soils and commonly are near Eakin, Ethan, Onita, Tetonka, and Walke soils. Agar soils formed in loess. Eakin soils are 20 to 40 inches deep over clay loam glacial till. Ethan soils are not so deep to free carbonates as the Highmore soils and contain more sand. They are on ridges and knolls. Homme soils do not have an argillic horizon. The moderately well drained Onita soils are in swales. The poorly drained Tetonka soils are in depressions. Walke soils have a natric horizon. They are nearly level.

Typical pedon of Highmore silt loam, 0 to 2 percent slopes, 100 feet north and 2,100 feet west of the southeast corner of sec. 27, T. 97 N., R. 64 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, very dark gray (10YR 3/1) moist; weak medium and fine subangular blocky structure parting to weak fine granular; slightly hard, very friable; neutral; abrupt smooth boundary.

B21t—7 to 12 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium and fine subangular blocky; hard, firm, slightly sticky and slightly plastic; shiny coatings on faces of peds; neutral; clear smooth boundary.

B22t—12 to 18 inches; dark brown (10YR 4/3) silty clay loam, dark grayish brown (10YR 4/2) moist; few coatings, dark grayish brown (10YR 4/2) and very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate medium and fine subangular blocky; hard, firm, slightly sticky and slightly plastic; mildly alkaline; abrupt wavy boundary.

B3ca—18 to 26 inches; light yellowish brown (2.5Y 6/4) silty clay loam, olive brown (2.5Y 4/4) moist; weak coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine accumulations of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

C1ca—26 to 32 inches; light yellowish brown (2.5Y 6/4) silty clay loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, friable; common fine accumulations of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

C2—32 to 48 inches; light yellowish brown (2.5Y 6/4) silty clay loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, friable; few fine accumulations of carbonate; few fine nests of gypsum; strong effervescence; moderately alkaline; clear wavy boundary.

IIC3—48 to 60 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; massive; hard, firm; few fine accumulations of carbonate; common fine nests of gypsum crystals; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 17 to 36 inches. The depth to free carbonates ranges from 12 to 26 inches. The thickness of the mollic epipedon ranges from 9 to 17 inches.

The A horizon has value of 3 to 5 (2 or 3 moist) and chroma of 1 or 2. It is 6 to 8 inches thick. It is slightly acid or neutral. The B2t horizon has hue of 10YR or 2.5Y, value of 4 or 5 (2 to 4 moist), and chroma of 2 or 3. The C horizon has hue of 10YR or 2.5Y, value of 5 to 7 (4 or 5 moist), and chroma of 2 to 4. It is silt loam, very fine sandy loam, or silty clay loam. It is mildly alkaline or moderately alkaline.

Homme series

The Homme series consists of deep, well drained soils formed in silty glacial drift over loamy glacial till on uplands. Permeability is moderately slow. Slopes range from 0 to 9 percent.

Homme soils are similar to Agar, Eakin, and Highmore soils and commonly are near Chancellor, Ethan, Onita, and Tetonka soils. Agar, Eakin, and Highmore soils have an argillic horizon. The poorly drained Chancellor soils are in deep swales. Ethan soils are not so deep to free carbonates as the Homme soils and contain more sand. They are on ridges and knolls. The moderately well drained Onita soils are in swales. The poorly drained Tetonka soils are in depressions.

Typical pedon of Homme silty clay loam, in an area of Homme-Onita silty clay loams, 1 to 6 percent slopes, 2,900 feet east and 610 feet north of the southwest corner of sec. 25, T. 95 N., R. 62 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silty clay loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to moderate fine granular; hard, friable; neutral; abrupt smooth boundary.

B21—8 to 15 inches; dark brown (10YR 4/3) silty clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate very fine and fine subangular blocky; very hard, friable; neutral; clear smooth boundary.

B22—15 to 27 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) moist; dark brown (10YR 3/3) coatings on faces of peds; moderate medium prismatic structure parting to strong fine subangular blocky; very hard, firm; neutral; clear smooth boundary.

B3ca—27 to 38 inches; pale brown (10YR 6/3) silty clay loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate fine

subangular blocky; very hard, firm; common medium accumulations of carbonate; violent effervescence; mildly alkaline; clear wavy boundary.

IIC1ca—38 to 50 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; massive; hard, friable; few medium distinct accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.

IIC2—50 to 60 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; common fine distinct gray (10YR 5/1) and few medium distinct yellowish brown (10YR 5/6) mottles; massive; hard, friable; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 30 to 45 inches. The depth to free carbonates ranges from 20 to 32 inches. The depth to loamy glacial till ranges from 30 to 50 inches.

The A horizon has hue of 10YR, value of 3 or 4 (2 or 3 moist), and chroma of 1 or 2. It is slightly acid or neutral. The B2 horizon has hue of 10YR, value of 4 or 5 (2 to 4 moist), and chroma of 2 or 3. It is neutral or mildly alkaline. The IIC horizon has hue of 10YR or 2.5Y, value of 5 to 7 (4 to 6 moist), and chroma of 2 to 4. It is clay loam or loam. It is mildly alkaline or moderately alkaline. In some pedons it has nests of gypsum in the lower part.

Houdek series

The Houdek series consists of deep, well drained soils formed in loamy glacial till on uplands. Permeability is moderate in the subsoil and moderately slow in the underlying material. Slopes range from 0 to 6 percent.

Houdek soils are similar to Clarno soils and commonly are near Betts, Clarno, Ethan, and Prosper soils. Betts soils do not have a mollic epipedon. Clarno and Ethan soils do not have an argillic horizon. Betts and Ethan soils are on convex ridges and knolls. The moderately well drained Prosper soils are in swales.

Typical pedon of Houdek loam, 0 to 2 percent slopes, 600 feet south and 300 feet east of the northwest corner of sec. 13, T. 97 N., R. 63 W.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to moderate medium granular; soft, very friable; neutral; abrupt wavy boundary.

B2t—6 to 15 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; stains on faces of peds, very dark grayish brown (10YR 3/2) and very dark brown (10YR 2/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky and blocky; hard, firm; neutral; abrupt wavy boundary.

B3ca—15 to 24 inches; light yellowish brown (2.5Y 6/4) clay loam, light olive brown (2.5Y 5/4) moist; weak coarse subangular blocky structure parting to weak medium subangular blocky; hard, firm; few fine accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.

C1ca—24 to 38 inches; light yellowish brown (2.5Y 6/4) clay loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, friable; few fine accumulations of carbonate; violent effervescence; mildly alkaline; gradual wavy boundary.

C2—38 to 60 inches; light yellowish brown (2.5Y 6/4) loam, light olive brown (2.5Y 5/4) moist; few fine faint dark brown (7.5YR 4/4) and gray (2.5Y 6/1) mottles; massive; slightly hard, friable; few fine nests of gypsum crystals; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 20 to 32 inches. The thickness of the mollic epipedon ranges from 8 to 18 inches. The depth to free carbonates ranges from 14 to 22 inches.

The A horizon has value of 3 to 5 (2 or 3 moist) and chroma of 1 or 2. It is 5 to 8 inches thick. It is slightly acid or neutral. The B2t horizon has hue of 10YR or 2.5Y, value of 4 or 5 (3 or 4 moist), and chroma of 2 or 3. It is neutral or mildly alkaline. The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 to 7 (5 or 6 moist), and chroma of 2 to 4. In the lower part it has few to many mottles, which are inherited from the parent material.

Hoven series

The Hoven series consists of deep, poorly drained soils formed in loamy and clayey alluvium in depressions on uplands. Permeability is very slow. Slopes are less than 2 percent.

Hoven soils are similar to Durrstein and Napa soils and commonly are near Beadle, DeGrey, Jerauld, Onita, and Walke soils. Durrstein and Napa soils are shallower to salts than the Hoven soils. They are on flood plains along intermittent drainageways. Beadle and Onita soils do not have a natric horizon. The well drained Beadle soils are on uplands, and the moderately well drained Onita soils are in swales on uplands. The moderately well drained DeGrey, Jerauld, and Walke soils are in plane areas on uplands.

Typical pedon of Hoven silt loam, 300 feet south and 2,498 feet east of the northwest corner of sec. 9, T. 97 N., R. 63 W.

A2—0 to 3 inches; grayish brown (10YR 5/2) silt loam, black (10YR 2/1) moist; weak medium platy structure parting to weak medium granular; soft, very friable; medium acid; abrupt smooth boundary.

B21t—3 to 6 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; grayish brown (10YR 5/2) coatings on the tops of columns; moderate medium columnar structure parting to strong medium blocky; extremely hard, very firm, sticky and plastic; few fine

iron and manganese concretions; slightly acid; clear smooth boundary.
B22t—6 to 20 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; moderate medium prismatic structure parting to moderate medium blocky; extremely hard, very firm, sticky and plastic; mildly alkaline; gradual wavy boundary.
B3—20 to 29 inches; gray (10YR 5/1) silty clay, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; few fine nests of gypsum; slight effervescence; mildly alkaline; gradual wavy boundary.
C1cacs—29 to 42 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; common fine distinct gray (2.5Y 6/1), light olive brown (2.5Y 5/6), and very dark gray (10YR 3/1) mottles; massive; hard, firm, slightly sticky and slightly plastic; common nests of gypsum and other salts; few fine and medium accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.
C2ca—42 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; common fine and medium faint gray (2.5Y 6/1) and light olive brown (2.5Y 5/6) mottles; massive; hard, firm, slightly sticky and slightly plastic; common medium and large accumulations of carbonate; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 20 to 42 inches. Some pedons have an A1 horizon, which is 1 to 2 inches thick. The A2 horizon has value of 5 to 7 (2 to 4 moist) and chroma of 1 or 2. It is 2 to 6 inches thick. It ranges from medium acid to neutral. The B2t horizon has hue of 10YR or 2.5Y, value of 4 or 5 (2 or 3 moist), and chroma of 1 or 2. It ranges from slightly acid to moderately alkaline. The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 7 (3 to 5 moist), and chroma of 1 to 3. It is clay loam, silty clay loam, or clay. Also, it is silt loam below a depth of 40 inches in some pedons.

Inavale series

The Inavale series consists of deep, somewhat excessively drained soils formed in sandy alluvium on the flood plain along the Missouri River. Permeability is rapid. Slopes range from 0 to 6 percent.

Inavale soils commonly are near Haynie Variant, Inavale Variant, Munjor, and Onawa soils. Haynie Variant soils contain more silt and less sand than the Inavale soils. They are on low ridges on the flood plain. Inavale Variant soils have a seasonal high water table at a depth of 0.5 to 1.5 feet. They are adjacent to the Missouri River and on small islands in the river. Munjor and Onawa soils are farther from the river than the Inavale soils. Also, they contain less sand between depths of 10 and 40 inches and Onawa soils contain more clay throughout.

Typical pedon of Inavale loamy fine sand, 0 to 6 percent slopes, 2,800 feet west and 150 feet south of the northeast corner of sec. 19, T. 94 N., R. 64 W.

A1—0 to 4 inches; grayish brown (10YR 5/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; single grain; loose; slight effervescence; mildly alkaline; clear smooth boundary.
AC—4 to 10 inches; pale brown (10YR 6/3) loamy fine sand, dark grayish brown (10YR 4/2) moist; single grain; loose; slight effervescence; mildly alkaline; clear smooth boundary.
C1—10 to 32 inches; light gray (10YR 7/2) fine sand, grayish brown (10YR 5/2) moist; single grain; loose; slight effervescence; mildly alkaline; clear smooth boundary.
C2—32 to 60 inches; light brownish gray (10YR 6/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; single grain; loose; few thin strata of finer textured sediments; slight effervescence; mildly alkaline.

Reaction ranges from neutral to moderately alkaline throughout the profile. Some pedons have a thin layer of organic mulch at the surface. The A1 horizon has value of 5 or 6 (4 or 5 moist) and chroma of 2 or 3. It is loamy fine sand, fine sand, loamy sand, sandy loam, or fine sandy loam. The C horizon has value of 5 to 7 (4 to 6 moist) and chroma of 2 or 3. In some pedons it has a few faint mottles below a depth of 40 inches.

Inavale Variant

The Inavale Variant consists of deep, poorly drained soils formed in sandy alluvium on the flood plain along the Missouri River. Permeability is rapid. Slopes are less than 2 percent.

Inavale Variant soils commonly are near Inavale soils. Inavale soils are somewhat excessively drained and do not have a water table within a depth of 6.0 feet. They are higher on the flood plain than the Inavale Variant.

Typical pedon of Inavale Variant loamy fine sand, 1,700 feet south and 2,150 feet west of the northeast corner of sec. 29, T. 94 N., R. 64 W.

A1—0 to 7 inches; light brownish gray (10YR 6/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; single grain; loose; slight effervescence; mildly alkaline; clear smooth boundary.
AC—7 to 18 inches; light brownish gray (10YR 6/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; common medium distinct yellowish brown (10YR 5/6) and dark yellowish brown (10YR 4/6) mottles; single grain; loose; slight effervescence; mildly alkaline; clear smooth boundary.
C—18 to 60 inches; light gray (10YR 7/2) stratified fine sand and loamy fine sand, grayish brown (10YR 5/2) moist; single grain; loose; slight effervescence; mildly alkaline.

Reaction is mildly alkaline or moderately alkaline throughout the profile. The A1 horizon has value of 5 or 6 (4 or 5 moist) and chroma of 2 or 3. It dominantly is loamy fine sand but in some pedons is fine sand. The C horizon has value of 5 to 7 (4 to 6 moist) and chroma of 2 or 3. It dominantly is stratified loamy fine sand and fine sand, but strata of sand and silt are in some pedons.

Jerauld series

The Jerauld series consists of deep, moderately well drained soils formed in glacial till on uplands. Permeability is slow. Slopes range from 0 to 4 percent.

Jerauld soils commonly are near Beadle, DeGrey, Eakin, Hoven, and Onita soils. Beadle, Eakin, and Onita soils do not have a natric horizon. Beadle and Eakin soils are higher on the landscape than the Jerauld soils, and Onita soils are in swales. DeGrey soils are deeper to visible salts than the Jerauld soils. Also, they are slightly higher on the landscape. The poorly drained Hoven soils are in depressions.

Typical pedon of Jerauld silt loam, in an area of Beadle-Jerauld complex, 0 to 4 percent slopes, 720 feet west and 300 feet south of the northeast corner of sec. 14, T. 100 N., R. 69 W.

A2—0 to 3 inches; grayish brown (10YR 5/2) silt loam, very dark gray (10YR 3/1) moist; weak medium blocky structure parting to weak medium platy; slightly hard, very friable; slightly acid; abrupt smooth boundary.

B2t—3 to 8 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; thin grayish brown (10YR 5/2) coatings on the tops and upper sides of columns; moderate medium columnar structure; extremely hard, very firm, sticky and plastic; neutral; abrupt smooth boundary.

B3—8 to 18 inches; brown (10YR 5/3) clay, dark grayish brown (10YR 4/2) moist; weak coarse blocky structure; extremely hard, very firm, sticky and plastic; few fine nests of salt crystals and accumulations of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

C1ca—18 to 32 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; weak coarse blocky structure; hard, firm, sticky and plastic; few fine nests of salt crystals; common fine accumulations of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

C2—32 to 48 inches; multicolored clay loam; massive; hard, firm, sticky and slightly plastic; few shale chips; few fine nests of salt crystals and accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.

C3—48 to 60 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and slightly plastic; few shale chips; few stains, dark yellowish brown (10YR 4/4) moist; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 10 to 20 inches. The depth to free carbonates ranges from 6 to 12 inches.

Some pedons have an A1 horizon, which is 1 to 2 inches thick. The A2 horizon has value of 5 to 7 (3 to 5 moist) and chroma of 1 or 2. It is 1 to 3 inches thick. It is slightly acid or neutral. The B2t horizon has hue of 10YR or 2.5Y, value of 4 or 5 (2 or 3 moist), and chroma of 1 or 2. It is clay or silty clay. It ranges from neutral to moderately alkaline. The C horizon has hue of 10YR or 2.5Y, value of 5 to 7 (4 to 6 moist), and chroma of 2 to 4. It is clay loam, silty clay loam, or clay. It ranges from mildly alkaline to strongly alkaline. It has few to many nests of salts and accumulations of carbonate.

Lane series

The Lane series consists of deep, well drained soils formed in clayey and silty sediments on foot slopes. Permeability is moderately slow. Slopes range from 0 to 6 percent.

Lane soils are similar to Onita soils and commonly are adjacent to Eakin, Ethan, and Highmore soils. The adjacent soils contain less clay in the subsoil than the Lane soils. Also, they are higher on the landscape. Ethan soils are not dark to a depth of 20 inches. Onita soils are leached of carbonates to a depth of more than 20 inches.

Typical pedon of Lane silty clay loam, 0 to 2 percent slopes, 125 feet north and 2,500 feet east of the southwest corner of sec. 20, T. 96 N., R. 65 W.

Ap—0 to 8 inches; dark gray (10YR 4/1) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, friable; neutral; abrupt wavy boundary.

B21t—8 to 16 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, firm; mildly alkaline; abrupt wavy boundary.

B22tca—16 to 24 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure parting to moderate medium blocky and subangular blocky; very hard, firm; few fine accumulations of carbonate; slight effervescence; mildly alkaline; gradual wavy boundary.

B3ca—24 to 36 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; dark grayish brown (10YR 4/2) coatings on faces of peds; weak coarse subangular blocky structure; very hard, firm; few fine accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.

C1—36 to 54 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; massive; hard, firm; few fine gypsum crystals; strong

effervescence; mildly alkaline; gradual wavy boundary.
C2—54 to 60 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; massive; hard, firm; few fine gypsum crystals; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 30 to 50 inches. The mollic epipedon ranges from 20 to 30 inches in thickness and extends into the B2t horizon. It typically includes all of this horizon. The depth to free carbonates ranges from 8 to 20 inches.

The A horizon has value of 3 or 4 (2 or 3 moist) and chroma of 1 or 2. It dominantly is silty clay loam but in some pedons is silt loam. It is 8 to 12 inches thick. It is slightly acid or neutral. The B2t horizon has value of 4 to 6 (3 to 5 moist) and chroma of 2 or 3. The C horizon is silty clay, silty clay loam, or clay loam.

Lowry series

The Lowry series consists of deep, well drained soils formed in loess on uplands. Permeability is moderate. Slopes range from 0 to 15 percent.

Lowry soils are similar to Dorna and Sully soils and commonly are near Agar, Dorna, Gavins, Mobridge, and Sully soils. Agar soils contain more clay in the subsoil than the Lowry soils. Also, they are slightly lower on the landscape and farther from the Missouri River. Dorna soils are 20 to 40 inches deep over clayey sediments. Gavins soils are 10 to 20 inches deep over siltstone. They are on the steeper parts of the landscape. The moderately well drained Mobridge soils are in swales. Sully soils do not have a mollic epipedon. They are on knolls and ridges.

Typical pedon of Lowry silt loam, 2 to 6 percent slopes, 1,000 feet south and 2,100 feet west of the northeast corner of sec. 14, T. 96 N., R. 67 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; soft, very friable; neutral; clear smooth boundary.
B2—7 to 15 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure; slightly hard, very friable; neutral; abrupt wavy boundary.
B3—15 to 22 inches; grayish brown (10YR 5/2) silt loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable; slight effervescence; mildly alkaline; clear wavy boundary.
C1ca—22 to 30 inches; brown (10YR 5/3) silt loam, dark brown (10YR 4/3) moist; weak coarse subangular blocky structure; hard, very friable; common very fine threads and few fine accumulations of carbonate; few insect casts; strong effervescence; mildly alkaline; clear wavy boundary.
C2ca—30 to 36 inches; pale brown (10YR 6/3) silt loam, dark brown (10YR 4/3) moist; massive; hard, very friable; few fine accumulations and common fine threads of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.
C3—36 to 50 inches; brown (10YR 5/3) silt loam, dark brown (10YR 4/3) moist; massive; soft, very friable; strong effervescence; moderately alkaline; abrupt smooth boundary.
A1b—50 to 60 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 14 to 30 inches. The depth to free carbonates ranges from 8 to 20 inches. The thickness of the mollic epipedon ranges from 8 to 20 inches. Some pedons do not have a buried horizon.

The A horizon has value of 4 or 5 (2 or 3 moist) and chroma of 2 or 3. It is neutral or mildly alkaline. It is 6 to 9 inches thick. The B2 horizon has hue of 10YR or 2.5Y, value of 4 or 5 (2 or 3 moist), and chroma of 2 or 3. The C horizon has hue of 10YR or 2.5Y, value of 4 to 6 (3 to 5 moist), and chroma of 2 or 3. It is loam or silt loam.

Meadin series

The Meadin series consists of excessively drained soils on high terraces. These soils are shallow over gravelly sand. Permeability is very rapid. Slopes range from 15 to 30 percent.

Meadin soils are similar to Talmo soils and commonly are near Betts, Ethan, Okaton, and Sansarc soils. All of the nearby soils are slightly lower on the landscape than the Meadin soils. Betts and Ethan soils formed in clay loam glacial till. The shallow Okaton and Sansarc soils formed in clayey residuum of shale. Carbonates are nearer the surface in the Talmo soils than in the Meadin soils.

Typical pedon of Meadin loam, 15 to 30 percent slopes, 100 feet east and 1,800 feet south of the northwest corner of sec. 1, T. 95 N., R. 65 W.

A11—0 to 4 inches; dark gray (l0YR 4/1) loam, very dark gray (10YR 3/1) moist; weak coarse subangular blocky structure parting to moderate medium granular; soft, very friable; slightly acid; clear smooth boundary.
A12—4 to 10 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse blocky and subangular blocky structure parting to weak medium granular; slightly hard, very friable; slightly acid; clear smooth boundary.
AC—10 to 17 inches; dark grayish brown (10YR 4/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky

structure; soft, very friable; slightly acid; gradual smooth boundary.
IIC—17 to 60 inches; very pale brown (10YR 7/3) gravelly sand, pale brown (10YR 6/3) moist; single grain; loose; slightly acid.

The thickness of the solum ranges from 12 to 20 inches and corresponds to the depth to gravelly sand. The thickness of the mollic epipedon ranges from 10 to 20 inches. Reaction is slightly acid or neutral throughout the profile.

The A horizon has value of 4 or 5 (2 or 3 moist) and chroma of 1 or 2. In some pedons the C horizon is stratified with finer textured material.

Mobridge series

The Mobridge series consists of deep, moderately well drained soils formed in silty alluvium in swales on uplands. Permeability is moderate. Slopes range from 0 to 2 percent.

Mobridge soils are similar to Onita and Prosper soils and commonly are near Agar and Lowry soils. The well drained Agar and Lowry soils are on the higher parts of the landscape. Onita soils contain more clay in the subsoil than the Mobridge soils. Prosper soils contain more sand and less silt throughout than the Mobridge soils.

Typical pedon of Mobridge silt loam, 190 feet north and 1,000 feet west of the southeast corner of sec. 12, T. 99 N., R. 70 W.

Ap—0 to 6 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, very friable; neutral; abrupt smooth boundary.
A12—6 to 12 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; weak coarse subangular blocky structure parting to weak fine granular; slightly hard, friable; neutral; clear smooth boundary.
B21t—12 to 17 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; shiny coatings on faces of peds; hard, firm, slightly sticky and slightly plastic; neutral; clear smooth boundary.
B22t—17 to 23 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to moderate fine subangular blocky; shiny coatings on faces of peds; hard, firm, slightly sticky and slightly plastic; neutral; clear wavy boundary.
B3ca—23 to 32 inches; light brownish gray (10YR 6/2) silty clay loam, dark brown (10YR 4/3) moist; weak coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.
C1ca—32 to 40 inches; light yellowish brown (10YR 6/4) silty clay loam, brown (10YR 5/3) moist; massive; hard, firm, slightly sticky and slightly plastic; common fine and medium accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.
C2—40 to 60 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 5/3) moist; few fine distinct gray (10YR 5/1) and yellowish brown (10YR 5/6) mottles; massive; hard, firm, slightly sticky and slightly plastic; few fine accumulations of carbonate; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 25 to 46 inches. The thickness of the mollic epipedon ranges from 20 to 30 inches. The depth to free carbonates ranges from 22 to 32 inches.

The A horizon has value of 3 or 4 (2 or 3 moist) and chroma of 1 or 2. It is 7 to 14 inches thick. It is slightly acid or neutral. The B2t horizon has value of 3 or 4 (2 or 3 moist) and chroma of 1 or 2. It is neutral or mildly alkaline. The C horizon has value of 5 to 7 (4 to 6 moist) and chroma of 2 to 4. It is mildly alkaline or moderately alkaline. It is clay loam, silty clay loam, or silt loam.

Munjor series

The Munjor series consists of deep, well drained soils formed in sandy and loamy alluvium on the flood plain along the Missouri River. Permeability is moderately rapid. Slopes range from 0 to 2 percent.

Munjor soils are similar to Haynie Variant soils and commonly are near Haynie, Haynie Variant, and Inavale soils. Haynie Variant and Haynie soils contain more silt and less sand between depths of 10 and 40 inches than the Munjor soils. They are in positions on the landscape similar to those of the Munjor soils. Inavale soils contain more sand and less clay between depths of 10 and 40 inches than the Munjor soils. They are adjacent to the Missouri River.

Typical pedon of Munjor fine sandy loam, 2,250 feet west and 700 feet south of the northeast corner of sec. 19, T. 93 N., R. 62 W.

Ap—0 to 11 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure parting to weak fine granular; loose; slight effervescence; mildly alkaline; abrupt smooth boundary.
C1—11 to 49 inches; pale brown (10YR 6/3) loamy very fine sand stratified with thin layers of finer and coarser textured material; dark brown (10YR 4/3) moist; loose; slight effervescence; mildly alkaline; gradual wavy boundary.
C2—49 to 60 inches; pale brown (10YR 6/3) loamy very fine sand, dark grayish brown (10YR 4/2) moist; massive; loose; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 7 to 13 inches and corresponds to the thickness of the A horizon. Free carbonates are at the surface.

The A horizon has value of 5 or 6 (3 or 4 moist) and chroma of 2 or 3. It dominantly is fine sandy loam but in some pedons is loam. The C horizon has value of 5 or 6 (4 or 5 moist) and chroma of 2 or 3.

Napa series

The Napa series consists of deep, poorly drained soils formed in clayey and silty alluvium on flood plains. Permeability is very slow. Slopes are less than 2 percent.

Napa soils are similar to Durrstein and Hoven soils and commonly are near Bon and Salmo soils. Bon and Salmo soils do not have a natric horizon. They are in positions on the landscape similar to those of the Napa soils. The mollic epipedon in Durrstein soils is thinner than that in the Napa soils. Hoven soils have a lower content of visible salt crystals than the Napa soils. They are in depressions in the uplands.

Typical pedon of Napa silt loam, in an area of Salmo-Napa complex, 540 feet south and 1,880 feet east of the northwest corner of sec. 10, T. 97 N., R. 63 W.

A2—0 to 1 inch; gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; weak medium platy structure parting to weak medium and fine granular; soft, very friable; mildly alkaline; abrupt smooth boundary.

B21t—1 to 4 inches; very dark gray (10YR 3/1) silty clay, black (10YR 2/1) moist; moderate medium columnar structure parting to moderate medium prismatic; extremely hard, extremely firm, very sticky and very plastic; mildly alkaline; clear smooth boundary.

B22tsa—4 to 8 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; extremely hard, extremely firm, very sticky and very plastic; common nests of salts; mildly alkaline; abrupt smooth boundary.

B23tsa—8 to 19 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; moderate medium prismatic structure parting to weak medium subangular blocky; extremely hard, very firm, sticky and plastic; common nests of salts; strong effervescence; moderately alkaline; clear wavy boundary.

B3sa—19 to 24 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) moist; weak coarse blocky structure; extremely hard, very firm, very sticky and very plastic; few nests of gypsum crystals; strong effervescence; moderately alkaline; clear wavy boundary.

C1cacs—24 to 33 inches; dark gray (10YR 4/1) silty clay, very dark brown (10YR 2/2) moist; massive; extremely hard, very firm, very sticky and very plastic; common fine nests of gypsum crystals; common medium accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.

C2g—33 to 60 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) moist; massive; extremely hard, very firm, sticky and plastic; few fine accumulations of carbonate; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 20 to 35 inches. The depth to free carbonates ranges from 6 to 45 inches. The depth to accumulations of salts and gypsum ranges from 1 to 8 inches.

The A2 horizon has value of 5 to 7 (3 or 4 moist). It is 1/8 to 1 inch thick. The B horizon has hue of 10YR, 2.5Y, or 5Y, value of 3 or 4 (2 or 3 moist), and chroma of I. The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 3 to 5 (2 to 4 moist), and chroma of 1 to 3. It is silty clay or clay.

Okaton series

The Okaton series consists of shallow, well drained soils formed in residuum of clayey shale on the breaks along the Missouri River. Permeability is slow. Slopes range from 15 to 40 percent.

Okaton soils are similar to Gavins and Sansarc soils and commonly are near Betts, Boyd, Lowry, Sansarc, and Sully soils. Betts soils formed in clay loam glacial till on the higher parts of the landscape. Boyd soils are 20 to 40 inches deep over shale. They are on the less sloping parts of the landscape. Gavins soils formed in residuum of siltstone and contain more silt than the Okaton soils. The deep Lowry and Sully soils formed in loess. They are on the less sloping parts of the landscape. Sansarc soils contain more clay than the Okaton soils.

Typical pedon of Okaton silty clay, 15 to 40 percent slopes, 1,040 feet east and 2,080 feet north of the southwest corner of sec. 30, T. 97 N., R. 67 W.

A1—0 to 4 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; moderate fine granular structure; slightly hard, friable, sticky and plastic; many fine roots; strong effervescence; mildly alkaline; clear smooth boundary.

AC—4 to 12 inches; grayish brown (10YR 5/2) silty clay, brown (10YR 5/3) moist; weak medium subangular blocky structure parting to weak fine subangular blocky; hard, firm, sticky and plastic; many fine roots; strong effervescence; mildly alkaline; clear smooth boundary.

C—12 to 17 inches; light brownish gray (2.5Y 6/2) shaly clay, light yellowish brown (2.5Y 6/4) and grayish brown (2.5Y 5/2) moist; weak coarse subangular blocky structure; hard, firm, sticky and plastic; about 50 percent shale fragments; common fine roots; slight effervescence; mildly alkaline; clear smooth boundary.

Cr1—17 to 21 inches; light brownish gray (2.5Y 6/2) and pale yellow (2.5Y 7/4) shale, grayish brown (2.5Y

5/2) and light yellowish brown (2.5Y 6/4) moist; hard, brittle; common roots; strong effervescence; mildly alkaline; gradual wavy boundary.

Cr2cs—21 to 40 inches; light brownish gray (2.5Y 6/2) and pale yellow (2.5Y 7/4) shale, grayish brown (2.5Y 5/2) and light yellowish brown (2.5Y 6/4) moist; hard, brittle; common medium nests of gypsum; few fine roots between bedding planes; strong effervescence; mildly alkaline; gradual wavy boundary.

Cr3—40 to 60 inches; pale yellow (2.5Y 7/4) shale, light yellowish brown (2.5Y 6/4) moist; hard, brittle; common medium and coarse accumulations of carbonate and few medium nests of gypsum between shale plates; slight effervescence; mildly alkaline.

The depth to bedrock ranges from 8 to 20 inches. Reaction is mildly alkaline or moderately alkaline in and above the bedrock.

The A1 horizon has hue of 10YR or 2.5Y, value of 5 to 7 (4 or 5 moist), and chroma of 2 or 3. The C horizon has hue of 10YR or 2.5Y, value of 5 to 7 (4 to 6 moist), and chroma of 2 to 4. It is shaly clay in which the content of shale fragments ranges, by volume, from 50 to 90 percent. The Cr horizon has hue of 10YR or 2.5Y, value of 5 to 7 (4 to 6 moist), and chroma of 2 to 4. Few or common, fine to coarse accumulations of carbonate and few or common, medium or fine nests of gypsum are between the shale plates.

Onawa series

The Onawa series consists of deep, poorly drained and somewhat poorly drained soils formed in clayey and loamy alluvium on the flood plain along the Missouri River. Permeability is moderately slow in the upper part of these soils and moderate in the underlying material. Slopes are less than 2 percent.

The Onawa soils in this county receive somewhat less precipitation than is defined as the range for the series. This difference, however, does not alter the use or behavior of the soils.

Onawa soils are similar to Albaton soils and commonly are adjacent to Albaton, Aowa, Haynie Variant, Inavale, and Munjor soils. Albaton soils are clayey throughout. Aowa soils contain less clay in the upper part than the Onawa soils. They are on the slightly higher parts of the flood plain. Haynie Variant and Munjor soils have a light colored surface layer. They are on slight rises on the flood plain. Inavale soils are sandy throughout. They are on narrow ridges adjacent to the river.

Typical pedon of Onawa silty clay, 2,350 feet south and 2,400 feet east of the northwest corner of sec. 9, T. 93 N., R. 63 W.

A1—0 to 6 inches; dark grayish brown (2.5Y 4/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; weak very fine and fine subangular blocky structure; hard, friable; slight effervescence; mildly alkaline; clear smooth boundary.

C1g—6 to 21 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; few fine distinct pale olive (5Y 6/3) mottles; moderate very fine and fine blocky structure; very hard, firm; slight effervescence; mildly alkaline; gradual wavy boundary.

IIC2g—21 to 60 inches; light brownish gray (2.5Y 6/2) silt loam stratified with thin layers of loam, very fine sand, and fine sand; dark grayish brown (2.5Y 4/2) and pale olive (5Y 6/3) moist; few fine distinct strong brown (7.5YR 5/6) and common medium distinct pale olive (5Y 6/3) mottles; massive; slightly hard, very friable; strong effervescence; mildly alkaline.

The thickness of the solum is less than 10 inches and is the same as the thickness of the A horizon. The depth to the underlying stratified silt loam ranges from 20 to 30 inches.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5 (3 moist), and chroma of 1 or 2. It dominantly is silty clay or fine sandy loam but in some pedons is clay. The IIC2g horizon has hue of 2.5Y or 5Y, value of 5 or 6 (4 to 6 moist), and chroma of 1 or 2.

Onita series

The Onita series consists of deep, moderately well drained soils formed in local alluvium in swales on uplands. Permeability is moderately slow. Slopes are less than 2 percent.

Onita soils are similar to Lane, Mobridge, and Prosper soils and commonly are near Davison, Eakin, Highmore, Homme, Hoven, and Tetonka soils. Davison soils have a calcic horizon. They are slightly higher on the landscape than the Onita soils. The well drained Eakin, Highmore, and Homme soils are on uplands. The poorly drained Hoven and Tetonka soils are in depressions. Lane soils are more shallow to carbonates than the Onita soils. Mobridge and Prosper soils contain less clay in the subsoil than the Onita soils.

Typical pedon of Onita silt loam, 145 feet east and 675 feet south of the northwest corner of sec. 4, T. 96 N., R. 64 W.

Ap—0 to 5 inches; dark gray (10YR 4/1) silt loam, very dark gray (10YR 3/1) moist; weak coarse subangular blocky and weak thick platy structure parting to weak medium and fine granular; soft, very friable; slightly acid; abrupt smooth boundary.

A12—5 to 10 inches; dark gray (10YR 4/1) silt loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure parting to moderate medium granular; slightly hard, very friable; medium acid; clear smooth boundary.

B21t—10 to 16 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; hard, friable, sticky and plastic; shiny coatings on faces of peds; slightly acid; clear wavy boundary.

B22t—16 to 30 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; shiny coatings on faces of peds; slightly acid; abrupt wavy boundary.

B3ca—30 to 35 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; weak medium and coarse blocky structure; hard, firm, sticky and plastic; thin shiny coatings on faces of peds; strong effervescence; mildly alkaline; gradual wavy boundary.

C1ca—35 to 45 inches; yellowish brown (10YR 5/4) silty clay loam, brown (10YR 5/3) moist; massive; hard, firm, slightly sticky and slightly plastic; strong effervescence; mildly alkaline; clear smooth boundary.

IIC2cs—45 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine yellowish brown (10YR 5/6) iron stains; few fine accumulations of carbonate; common nests of gypsum crystals; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 30 to 52 inches. The depth to free carbonates ranges from 22 to more than 40 inches. The thickness of the mollic epipedon ranges from 20 to 40 inches.

The A horizon has value of 4 or 5 (2 or 3 moist) and chroma of 1 or 2. It is 8 to 12 inches thick. It is medium acid to neutral. It is silt loam or silty clay loam. The B2t horizon has hue of 10YR or 2.5Y, value of 4 or 5 (2 or 3 moist), and chroma of 2 or 3. It is slightly acid or neutral. It is silty clay loam or silty clay. The content of clay in this horizon ranges from 35 to 45 percent. Some pedons do not have a B3ca horizon. The C horizon has hue of 10YR or 2.5Y, value of 5 to 7 (4 to 6 moist), and chroma of 2 to 4. It is mildly alkaline or moderately alkaline. In some pedons it is silt loam.

Promise series

The Promise series consists of deep, well drained soils formed in sediments weathered from clayey shale on uplands, fans, and terraces. Permeability is slow or very slow. Slopes range from 0 to 6 percent.

Promise soils are similar to Boyd soils and commonly are near Boyd, Dorna, Lane, and Sansarc soils. Boyd soils are moderately deep over shale. Dorna soils formed in silty material 20 to 40 inches deep over clayey sediments. They are on uplands. Lane soils contain less clay in the subsoil than the Promise soils. They are on foot slopes. The shallow Sansarc soils are in the steeper areas.

Typical pedon of Promise silty clay, 0 to 2 percent slopes, 300 feet west and 1,600 feet south of the northeast corner of sec. 33, T. 96 N., R. 66 W.

Ap—0 to 6 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) moist; weak thick and medium platy structure parting to moderate medium granular; very hard, very firm, sticky and plastic; mildly alkaline; abrupt smooth boundary.

B2—6 to 15 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to weak medium blocky and subangular blocky; extremely hard, extremely firm, very sticky and very plastic; slight effervescence; moderately alkaline; clear wavy boundary.

B3ca—15 to 26 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to moderate medium blocky and subangular blocky; extremely hard, extremely firm, very sticky and very plastic; few medium and common fine accumulations of carbonate; pressure faces evident; strong effervescence; moderately alkaline; gradual wavy boundary.

C1—26 to 33 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak coarse blocky structure; extremely hard, extremely firm, very sticky and very plastic; pressure faces evident; strong effervescence; moderately alkaline; gradual wavy boundary.

C2cs—33 to 48 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; extremely hard, extremely firm, very sticky and very plastic; few gypsum crystals; strong effervescence; moderately alkaline; gradual wavy boundary.

C3—48 to 60 inches; grayish brown (10YR 5/2) and dark grayish brown (10YR 4/2) clay, dark grayish brown (10YR 4/2) moist; massive; extremely hard, extremely firm, very sticky and very plastic; few fine accumulations of carbonate; few shale chips; few iron concretions; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 20 to 42 inches. The A horizon has hue of 10YR or 2.5Y, value of 4 or 5 (2 or 3 moist), and chroma of 1 or 2. It is 4 to 10 inches thick. In some pedons it is calcareous. It is neutral or mildly alkaline. The B horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6 (2 to 4 moist), and chroma of 1 to 3. It is mildly alkaline or moderately alkaline. The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6 (4 or 5 moist), and chroma of 2 or 3. It is moderately alkaline or strongly alkaline. In some pedons shale is at a depth of 40 to 60 inches.

Prosper series

The Prosper series consists of deep, moderately well drained soils formed in loamy alluvium over glacial till in swales on uplands. Permeability is moderate in the solum and moderately slow in the underlying material. Slopes are less than 2 percent.

Prosper soils are similar to Lane, Mobridge, and Onita soils and commonly are near Clarno, Hand, Houdek, and Tetonka soils. The well drained Clarno, Hand, and Houdek soils are on the higher parts of the landscape. Lane and Onita soils contain more clay in the subsoil than the Prosper soils. Mobridge soils contain more silt and less sand throughout than the Prosper soils. The poorly drained Tetonka soils are in depressions.

Typical pedon of Prosper loam, 2,380 feet south and 1,550 feet west of the northeast corner of sec. 5, T. 96 N., R. 62 W.

A11—0 to 6 inches; very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to weak medium and fine granular; slightly hard, friable; neutral; clear smooth boundary.

A12—6 to 11 inches; dark grayish brown (10YR 4/2) loam, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure parting to weak medium fine granular; slightly hard, friable; neutral; clear smooth boundary.

B21t—11 to 15 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium and fine blocky; very hard, firm, slightly sticky and slightly plastic; neutral; clear smooth boundary.

B22t—15 to 25 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium and fine blocky; very hard, firm, slightly sticky and slightly plastic; few shiny coatings on faces of peds; neutral; clear smooth boundary.

B3ca—25 to 32 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky and slightly plastic; few fine accumulations of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

C1ca—32 to 44 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, friable, slightly sticky and slightly plastic; few fine accumulations of carbonate; common fine nests of gypsum; violent effervescence; moderately alkaline; clear wavy boundary.

C2—44 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, friable, slightly sticky and slightly plastic; common fine nests of gypsum; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 25 to 36 inches. The depth to free carbonates ranges from 20 to 36 inches. The mollic epipedon ranges from 20 to 30 inches in thickness. It extends into the B22t horizon.

The A horizon has value of 3 or 4 (2 or 3 moist) and chroma of 1 or 2. It is 7 to 13 inches thick. It dominantly is loam but in some pedons is silt loam. The B2t horizon has hue of 10YR or 2.5Y, value of 3 to 5 (2 to 4 moist), and chroma of 1 to 3. It is clay loam or silty clay loam. The C horizon has hue of 10YR or 2.5Y, value of 5 to 7 (4 to 6 moist), and chroma of 2 to 4. It is clay loam or loam. In some pedons it does not have gypsum crystals.

Salmo series

The Salmo series consists of deep, poorly drained soils formed in silty and clayey alluvium on flood plains. Permeability is moderately slow. Slopes range from 0 to 2 percent.

Salmo soils commonly are near Bon and Napa soils. The moderately well drained Bon soils are on the higher parts of the flood plain. Napa soils have a natric horizon. They are in positions on the landscape similar to those of the Salmo soils.

Typical pedon of Salmo silty clay loam, 505 feet north and 2,622 feet west of the southeast corner of sec. 17, T. 96 N., R. 63 W.

A11—0 to 6 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; moderate fine granular structure; slightly hard, very friable; mildly alkaline; abrupt smooth boundary.

A12sa—6 to 9 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; weak medium prismatic structure parting to moderate medium granular; slightly hard, friable, slightly sticky and slightly plastic; common fine nests of salts; slight effervescence; mildly alkaline; clear smooth boundary.

A13sa—9 to 17 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; moderate medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common fine nests and threads of salts; strong effervescence; moderately alkaline; clear smooth boundary.

A14sacs—17 to 22 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable; common fine nests of salts and gypsum; slight effervescence; mildly alkaline; clear smooth boundary.

ACgsacs—22 to 37 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; weak coarse subangular blocky structure; very hard, friable, sticky and plastic; common fine nests of salts and gypsum; slight effervescence; mildly alkaline; clear wavy boundary.

C1g—37 to 42 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) moist; few fine distinct yellowish brown (10YR 5/4) mottles; massive; very hard, friable, sticky and plastic; slight effervescence; neutral; clear wavy boundary.
C2g—42 to 60 inches; gray (10YR 5/1) silty clay, very dark gray (10YR 3/1) moist; massive; very hard, very firm, sticky and plastic; common coarse accumulations of carbonate; strong effervescence; mildly alkaline.

The mollic epipedon ranges from 25 to more than 60 inches in thickness. Reaction is neutral to moderately alkaline throughout the profile.

The A horizon has hue of 10YR or 2.5Y. It is 12 to 25 inches thick. The Cg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6 (2 to 4 moist), and chroma of 1 or 2. It is silt loam, silty clay, or silty clay loam.

Sansarc series

The Sansarc series consists of shallow, well drained soils formed in residuum of clayey shale on the breaks along the Missouri River. Permeability is slow. Slopes range from 6 to 70 percent.

Sansarc soils are similar to Okaton soils and commonly are near Betts, Boyd, Gavins, Okaton, and Sully soils. Betts soils formed in clay loam glacial till. They are on the higher parts of the landscape. Boyd soils are moderately deep over shale. They are on smooth slopes. Gavins soils formed in residuum of siltstone. They are on the lower part of the breaks adjacent to the flood plain along the Missouri River. Okaton soils contain less clay than the Sansarc soils. The deep Sully soils formed in loess. They are on uplands adjacent to the breaks along the Missouri River.

Typical pedon of Sansarc clay, in an area of Sansarc-Boyd complex, 15 to 40 percent slopes, 780 feet west and 4,420 feet south of the northeast corner of sec. 24, T. 97 N., R. 68 W.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, firm, very sticky and plastic; few iron concretions at the surface; slight effervescence; mildly alkaline; clear smooth boundary.
C1—4 to 7 inches; dark grayish brown (2.5Y 4/2) clay, grayish brown (2.5Y 5/2) crushed, dark grayish brown (2.5Y 4/2) moist; massive; hard, very firm, very sticky and plastic; few shale chips; coatings of carbonate on the chips; slight effervescence; mildly alkaline; clear smooth boundary.
C2—7 to 13 inches; grayish brown (2.5Y 5/2) shaly clay, dark grayish brown (2.5Y 4/2) moist; massive; loose, very friable; more than 50 percent platy shale fragments; coatings of carbonate on the fragments; slight effervescence; mildly alkaline; clear smooth boundary.
Cr—13 to 60 inches; grayish brown (2.5Y 5/2) shale, light brownish gray (2.5Y 6/2) crushed, dark grayish brown (2.5Y 4/2) moist; hard, brittle; few fine accumulations of carbonate in seams; few fine roots to 40 inches, mostly along cleavage planes; slight effervescence; neutral.

The depth to shale ranges from 4 to 20 inches. The clay content of the horizons above the shale ranges from 55 to 65 percent. Reaction is mildly alkaline or moderately alkaline above the shale and ranges from medium acid to moderately alkaline in the shale. Some pedons do not have free carbonates.

The A horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6 (3 or 4 moist), and chroma of 1 or 2. The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6 (4 or 5 moist), and chroma of 2. The content of shale fragments ranges, by volume, from 5 to 20 percent in the C1 horizon and is more than 50 percent in the C2 horizon. The shale has a wide range in color.

Sully series

The Sully series consists of deep, well drained soils formed in silty loess on uplands. Permeability is moderate. Slopes range from 9 to 25 percent.

Sully soils are similar to Lowry soils and commonly are near Agar, Betts, Gavins, Lowry, and Sansarc soils. Agar and Lowry soils have a mollic epipedon. They are on the less sloping parts of the landscape. Betts soils formed in glacial till. They are on the higher parts of the landscape. Gavins soils are 10 to 20 inches deep over siltstone. They are on the steeper escarpments along the Missouri River and are lower on the landscape than the Sully soils. Sansarc soils formed in clayey residuum of shale. They generally are lower on the landscape than the Sully soils.

Typical pedon of Sully silt loam, 9 to 25 percent slopes, 800 feet south and 400 feet west of the northeast corner of sec. 16, T. 99 N., R. 70 W.

A1—0 to 4 inches; grayish brown (10YR 5/2) silt loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure parting to weak fine granular; soft, very friable; mildly alkaline; abrupt smooth boundary.
C1—4 to 15 inches; pale brown (10YR 6/3) silt loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; soft, very friable; few fine accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.
C2—15 to 60 inches; pale brown (10YR 6/3) silt loam, dark brown (10YR 4/3) moist; massive; soft, very friable; few fine accumulations of carbonate; strong effervescence; moderately alkaline.

The depth to free carbonates is less than 5 inches. The A horizon has value of 4 or 5 (3 or 4 moist) and chroma of 2 or 3. The C horizon has hue of 10YR or 2.5Y, value of 5 to 7 (4 or 5 moist), and chroma of 2 to 4. It is silt loam or very fine sandy loam. It is mildly alkaline or moderately alkaline.

Talmo series

The Talmo series consists of excessively drained soils that are very shallow over gravelly sand. These soils formed in gravelly outwash on uplands. Permeability is rapid. Slopes range from 2 to 25 percent.

Talmo soils are similar to Meadin soils and commonly are near Arlo, Betts, Delmont, Enet, and Ethan soils. Meadin soils are leached of carbonates throughout. The poorly drained Arlo soils are in swales. Betts and Ethan soils formed in clay loam glacial till on uplands. Delmont soils are 14 to 20 inches deep over gravelly sand. They are on outwash plains and terraces. Enet soils are 20 to 40 inches deep over gravelly sand. They are on uplands and terraces.

Typical pedon of Talmo gravelly loam, in an area of Delmont-Talmo complex, 2 to 9 percent slopes, 240 feet north and 1,100 feet west of the southeast corner of sec. 11, T. 100 N., R. 67 W.

A1—0 to 7 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; weak medium and fine granular structure; soft, very friable; mildly alkaline; abrupt smooth boundary.

IICca—7 to 60 inches; multicolored gravelly sand; single grain; loose; coatings of carbonate on undersides of pebbles; strong effervescence; mildly alkaline.

Gravelly sand is at a depth of 14 inches or less. The mollic epipedon is 7 to 10 inches thick. The A horizon has value of 3 to 5 (2 or 3 moist) and chroma of 1 or 2. It dominantly is gravelly loam but in some pedons is loam or gravelly sandy loam. The IICca horizon is mildly alkaline or moderately alkaline. The content of gravel in this horizon is, by volume, 50 to 75 percent.

Tetonka series

The Tetonka series consists of deep, poorly drained soils formed in local alluvium over glacial till in depressions and deep swales on uplands. Permeability is very slow. Slopes are 0 to 1 percent.

Tetonka soils are similar to Worthing soils and commonly are near Chancellor, Clarno, Eakin, Highmore, Homme, Onita, and Walke soils. Chancellor soils do not have an A2 horizon. They are in swales. The well drained Clarno, Eakin, Highmore, and Homme soils are on uplands. The moderately well drained Onita soils are in swales. Walke soils have a natric horizon. They are in plane areas on uplands. Worthing soils are very poorly drained.

Typical pedon of Tetonka silt loam, 51 feet west and 650 feet south of the northeast corner of sec. 17, T. 97 N., R. 63 W.

A1—0 to 7 inches; dark gray (10YR 4/1) silt loam, very dark gray (10YR 3/1) moist; common fine and medium distinct brownish yellow (10YR 6/6) mottles; moderate thick platy structure; soft, very friable; medium acid; clear wavy boundary.

A2—7 to 11 inches; gray (10YR 6/1) silt loam, dark grayish brown (10YR 4/2) moist; few fine distinct brownish yellow (10YR 6/6) mottles; weak thick platy structure; soft, very friable; medium acid; clear wavy boundary.

A&B—11 to 13 inches; gray (10YR 6/1) silt loam (A2), dark grayish brown (10YR 4/2) moist, and dark gray (10YR 4/1) silty clay (B2t), very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable; few fine concretions of iron and manganese oxide; slightly acid; clear smooth boundary.

B21t—13 to 17 inches; dark gray (10YR 4/1) silty clay, very dark brown (10YR 2/2) moist; thin patchy gray (10YR 6/1) coatings on vertical faces of peds; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; shiny films on faces of peds; few fine concretions of iron and manganese oxide; slightly acid; gradual smooth boundary.

B22t—17 to 31 inches; dark gray (10YR 4/1) silty clay, very dark brown (10YR 2/2) moist; thin patchy gray (10YR 6/1) coatings on vertical faces of peds; weak coarse prismatic structure parting to weak medium subangular blocky; hard, firm, sticky and plastic; shiny films on faces of peds; few fine concretions of iron and manganese oxide; slightly acid; gradual wavy boundary.

B23t—31 to 44 inches; gray (10YR 5/1) silty clay, very dark gray (l0YR 3/l) moist; weak coarse prismatic structure parting to moderate medium blocky; hard, firm, sticky and plastic; shiny films on faces of peds; few fine concretions of iron and manganese oxide; mildly alkaline; gradual wavy boundary.

B3ca—44 to 50 inches; gray (5Y 5/1) silty clay, dark olive gray (5Y 3/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; hard, firm, sticky and plastic; shiny films on faces of peds; few fine concretions of iron and manganese oxide; common fine and medium accumulations of carbonate; strong effervescence; mildly alkaline; clear wavy boundary.

Cca—50 to 60 inches; light gray (5Y 7/1) clay loam, dark gray (5Y 4/1) moist; common medium distinct light yellowish brown (2.5Y 6/4) mottles; massive; slightly hard, firm, sticky and plastic; common fine accumulations of carbonate; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 30 to 60 inches. The depth to free carbonates ranges from 36 to 60 inches.

The A1 horizon has value of 4 or 5 (2 or 3 moist) and chroma of 1 or 2. It is silt loam or silty clay loam. It is 6 to 12 inches thick. The A2 horizon has value of 5 to 7 (4 or 5 moist) and chroma of 1 or 2. It is 4 to 10 inches thick. It ranges from medium acid to neutral. The B2t horizon has hue of 10YR or 2.5Y, value of 4 or 5 (2 to 4 moist), and chroma of 1 or 2. It is clay or silty clay. It is slightly acid to mildly alkaline. The C horizon has hue of 5Y or 2.5Y, value of 5 to 7 (4 to 6 moist), and chroma of 1 or 2. It ranges from neutral to moderately alkaline. It is silty clay loam, silty clay, or clay loam.

Walke series

The Walke series consists of deep, moderately well drained soils formed in a silty and clayey mantle over clay loam glacial till on uplands. Permeability is moderately slow or slow. Slopes range from 0 to 2 percent.

Walke soils are similar to DeGrey soils and commonly are near DeGrey, Eakin, Highmore, Onita, and Tetonka soils. DeGrey soils have columnar structure in the B2t horizon. They are in plane or slightly concave areas. Eakin, Highmore, Onita, and Tetonka soils do not have a natric horizon. Eakin and Highmore soils are slightly higher on the landscape than the Walke soils, and Onita soils are in swales. The poorly drained Tetonka soils are in depressions.

Typical pedon of Walke silt loam, in an area of DeGrey-Walke silt loams, 1,070 feet west and 70 feet north of the southeast corner of sec. 23, T. 99 N., R. 67 W.

A11—0 to 3 inches; dark gray (10YR 4/1) silt loam, very dark gray (10YR 3/1) moist; weak fine granular structure; soft, very friable; slightly acid; clear smooth boundary.

A12—3 to 8 inches; dark grayish brown (10YR 4/2) silt loam, very dark gray (10YR 3/1) moist; moderate very fine and fine subangular blocky structure; slightly hard, very friable; slightly acid; clear smooth boundary.

B&A—8 to 11 inches; grayish brown (10YR 5/2) silty clay loam (B), very dark grayish brown (10YR 3/2) moist; patchy gray (10YR 5/1) silt coatings (A) on faces of peds; moderate medium subangular blocky structure; hard, friable; neutral; clear wavy boundary.

B2t—11 to 20 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; strong coarse prismatic structure parting to strong medium blocky; very hard, firm, sticky and plastic; neutral; clear wavy boundary.

B3ca—20 to 30 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; slight effervescence; moderately alkaline; clear wavy boundary.

C1cacs—30 to 36 inches; light yellowish brown (2.5Y 6/4) silty clay loam, olive brown (2.5Y 4/4) moist; weak fine prismatic structure parting to weak fine subangular blocky; very hard, firm, sticky and plastic; strong effervescence; moderately alkaline; clear wavy boundary.

IIC2cs—36 to 60 inches; pale yellow (2.5Y 7/4) clay loam, olive brown (2.5Y 4/4) moist; massive; hard, friable; common fine striations of salts and few medium nests of gypsum; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 19 to 33 inches. The depth to free carbonates ranges from 14 to 24 inches. The depth to the underlying glacial till ranges from 20 to 40 inches.

The A horizon has value of 4 or 5 (2 or 3 moist) and chroma of 1 or 2. It is slightly acid or neutral. Some pedons have an A2 horizon. The B2t horizon has hue of 10YR or 2.5Y, value of 4 or 5 (3 or 4 moist), and chroma of 2 or 3. It is neutral to moderately alkaline. The Cca horizon has hue of 10YR or 2.5Y, value of 5 or 6 (4 or 5 moist), and chroma of 2 to 4. It is mildly alkaline or moderately alkaline. The IIC horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 to 7 (4 to 6 moist), and chroma of 2 to 4. It is clay loam or clay. It is mildly alkaline or moderately alkaline.

Wendte Variant

The Wendte Variant consists of deep, somewhat poorly drained soils formed in clayey and silty alluvium on the flood plain along the Missouri River. Permeability is slow. Slopes range from 0 to 2 percent.

Wendte Variant soils are similar to Albaton soils and commonly are near Albaton, Aowa, Gavins, and Promise soils. The poorly drained and very poorly drained Albaton soils are on the lower parts of the flood plain. The moderately well drained Aowa soils are between the Wendte Variant soils and the Missouri River. The shallow, well drained Gavins soils are on river breaks. The well drained Promise soils are on foot slopes and fans.

Typical pedon of Wendte Variant silty clay, 200 feet east and 400 feet north of the southwest corner of sec. 36, T. 95 N., R. 65 W.

Ap—0 to 7 inches; grayish brown (10YR 5/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate medium platy structure parting to moderate medium granular; hard, firm, slightly sticky and slightly plastic; slight effervescence; mildly alkaline; clear smooth boundary.

C1—7 to 16 inches; stratified light brownish gray (10YR 6/2) and grayish brown (10YR 5/2) silty clay, dark

grayish brown (10YR 4/2) and very dark grayish brown (10YR 3/2) moist; moderate thin platy structure parting to moderate fine subangular blocky; hard, firm, slightly sticky and slightly plastic; slight effervescence; mildly alkaline; clear smooth boundary.

C2—16 to 60 inches; stratified grayish brown (10YR 5/2) silty clay and pale brown (10YR 6/3) silty clay loam, very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) moist; finely laminated; hard, firm, slightly sticky and slightly plastic; slight effervescence; mildly alkaline.

The thickness of the solum ranges from 5 to 9 inches. The A horizon has value of 4 or 5 (2 or 3 moist) and chroma of 1 or 2. The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 to 7 (3 to 5 moist), and chroma of 1 to 3. It is stratified silty clay, silty clay loam, or clay. Some pedons have gypsum and other salts. Some have 1/8- to 1-inch strata of fine sandy loam throughout.

Worthing series

The Worthing series consists of deep, very poorly drained soils formed in alluvium in depressions on uplands. Permeability is slow. Slopes are less than 1 percent.

Worthing soils are similar to Tetonka soils and commonly are near Eakin, Ethan, Onita, Tetonka, and Walke soils. The well drained Eakin and Ethan soils are on uplands. Onita and Walke soils are moderately well drained. Onita soils are in swales, and Walke soils are in slight depressions. The poorly drained Tetonka soils are in positions on the landscape similar to those of the Worthing soils. They have an A2 horizon.

Typical pedon of Worthing silty clay loam, 145 feet south and 1,210 feet east of the northwest corner of sec. 3, T. 97 N., R. 65 W.

A1—0 to 9 inches; dark gray (10YR 4/1) silty clay loam, black (10YR 2/1) moist; few fine distinct yellowish brown (10YR 5/6) mottles; weak thin platy structure parting to moderate medium granular; soft, very friable; slightly acid; abrupt smooth boundary.

B21t—9 to 19 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; few fine distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to weak coarse blocky; extremely hard, firm, slightly sticky and slightly plastic; few medium manganese concretions; slightly acid; gradual wavy boundary.

B22t—19 to 30 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; moderate medium prismatic structure parting to moderate medium blocky; extremely hard, firm, slightly sticky and slightly plastic; few medium manganese concretions; neutral; gradual wavy boundary.

B23t—30 to 39 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; weak medium blocky structure; very hard, firm, slightly sticky and slightly plastic; neutral; gradual wavy boundary.

B3g—39 to 44 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) moist; few fine distinct olive (5Y 4/4) mottles; weak coarse blocky structure; very hard, firm, slightly sticky and slightly plastic; few fine nests of salt crystals; mildly alkaline; gradual wavy boundary.

C1g—44 to 60 inches; gray (10YR 5/1) silty clay, very dark gray (10YR 3/1) moist; few fine distinct olive (5Y 4/4) mottles; massive; hard, firm, slightly sticky and slightly plastic; mildly alkaline.

The thickness of the solum ranges from 38 to 60 inches. The mollic epipedon ranges from 35 to more than 60 inches in thickness. The depth to free carbonates ranges from 40 to more than 60 inches.

The A horizon has value of 3 or 4 (2 moist) and chroma of 1. It is slightly acid or neutral. It is 8 to 20 inches thick. The B2t horizon has hue of 10YR or 2.5Y, value of 3 or 4 (2 or 3 moist), and chroma of 1. It is clay or silty clay. The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 7 (3 to 5 moist), and chroma of 1 or 2. It is mildly alkaline or moderately alkaline. It is silty clay loam, clay loam, or silty clay.

formation of the soils

Soil forms when soil-forming processes act on deposited or accumulated geologic material. The characteristics of the soil at any given point are determined by the physical and mineralogical composition of the parent material, the climate under which the soil material has accumulated and existed since accumulation, the plant and animal life on and in the soil, the relief, and the length of time that the forces of soil formation have acted on the soil material.

Climate and plant and animal life, chiefly plants, are active factors of soil formation. They act on the parent material and slowly change it to a natural body that has genetically related horizons. The effects of climate and plant and animal life are conditioned by relief. The parent material affects the kind of soil profile that forms and, in extreme cases, determines it almost entirely. Finally, time is needed for changing the parent material into a soil. Some time is always needed for the development of distinct horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the other four. The following paragraphs relate the factors of soil formation to the soils in Charles Mix County.

climate

Climate directly affects the rate of chemical and physical weathering. Charles Mix County has a continental climate, which generally is characterized by cold winters and hot summers. This climate favors the growth of grasses and the resulting accumulation of organic matter in the upper part of the soil. It also favors a moderately slow rate of weathering or soil formation. The climate generally is uniform throughout the county. Therefore, climate alone does not account for differences among the soils in the county. Detailed information about the climate is given under the heading "General nature of the county."

plant and animal life

Plants, animals, insects, earthworms, bacteria, and fungi have an important effect on soil formation. They cause gains in organic matter, gains or losses in plant nutrients, and changes in soil structure and porosity. In Charles Mix County the prairie grasses have had more influence than other living organisms on soil formation. The nearly level Bon soils contain more organic matter than the more sloping Betts soils because they have a more extensive grass cover. As a result, more nutrients are released for plant food. Earthworms, insects, and burrowing animals help to keep the soil open and porous. Bacteria and fungi decompose plant residue, thus releasing nutrients that plants use as food.

parent material

Many of the soils in Charles Mix County formed in glacial material derived from preglacial formations of granite, gneiss, limestone, sandstone, and shale. The glacier ground up and mixed these materials as it transported them. It then redeposited them as it melted. Some deposits consist of material sorted either by water as the material was deposited or by wind and water after it was deposited; others consist of unsorted material or glacial till.

Glacial deposits of Late Wisconsin age are on the surface throughout most of the county (*4*). These deposits consist mainly of silty glacial drift, poorly sorted glacial till, stratified glacial outwash, and stratified loamy glacial drift. The glacial drift has a high content of silt, weathers to light yellowish brown silt loam, is friable, and contains few fragments of shale or stones. DeGrey, Eakin, Highmore, and Walke soils formed in silty drift. The glacial till is loam or clay loam that contains small fragments of shale and small stones and rocks. Betts, Clarno, and Ethan soils formed in this glacial till.

Glacial outwash consists of sand, gravel, and loamy material deposited by glacial melt water. Delmont, Enet, and Talmo soils formed in loamy glacial outwash underlain by gravelly sand within a depth of 40 inches. Henkin soils formed in loamy and sandy melt water deposits.

Hoven, Prosper, and Tetonka soils formed partly or entirely in local alluvium washed in from sloping adjacent soils in the uplands. Bon soils formed in alluvium deposited by small streams. Albaton, Aowa, Haynie, Inavale, Munjor, and Onawa soils formed in alluvium on the flood plain along the Missouri River.

Loess mantles the uplands above the breaks adjacent to Lake Francis Case and the Missouri River. Agar, Lowry, and Sully soils formed in this silty loess.

relief

Relief affects soil formation through its effect on drainage, runoff, erosion, plant cover, and soil temperature. On the steeper soils, such as Betts soils, much of the rainfall is lost through runoff and thus does not penetrate the surface. Much of the surface soil is lost through erosion. As a result, these soils have a thin surface layer and are calcareous at or near the surface. Runoff is less rapid on Clarno, Highmore, and other less sloping soils, and more moisture penetrates the surface. These soils are calcareous at a greater depth than the Betts soils. Also, the horizons in which organic matter accumulates are thicker.

Prosper soils are in swales that receive runoff from adjacent soils. The horizons in which organic matter accumulates are thicker than those in the Clarno and Highmore soils. Tetonka soils are in depressions where water ponds. They have the colors and mottles characteristic of poorly drained soils.

time

The length of time that soil material has been exposed to the other four factors of soil formation is reflected in the kinds of soil that form. The degree of profile development reflects the age of a soil. The oldest soils are on the parts of the landscape that have been stable for the longest time. In Charles Mix County these are the Clarno, Highmore, and Homme soils. The youngest soils either are those in which natural erosion removes nearly as much soil material as is formed through the weathering of parent material or are alluvial soils, which receive new material each time the area is flooded. Betts soils are an example of young soils that are subject to natural erosion, and Bon soils are an example of young alluvial soils.

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glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compact layers to depths below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Drainage class (natural). Refers to the removal of water from the soil. Drainage classes are determined on the basis of an overall evaluation of water removal as influenced by climate, slope, and position on the landscape. Precipitation, runoff, amount of moisture infiltrating the soil, and rate of water movement

through the soil affect the degree and duration of wetness. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. The soils in this class generally are free of mottles throughout. They commonly are shallow, very porous, or steep, or a combination of these.

Somewhat excessively drained.—Water is removed from the soil rapidly. The soils in this class generally are free of mottles throughout. They commonly are shallow or moderately deep, very porous, or steep, or a combination of these.

Well drained.—Water is removed from the soil so readily that the upper 40 inches generally does not have the mottles or dull colors related to wetness.

Moderately well drained.—Water is removed from the soil so slowly that the upper 20 to 40 inches has the mottles or dull colors related to wetness. The soils in this class commonly have a slowly permeable layer, have a water table, or receive runoff or seepage, or they are characterized by a combination of these.

Somewhat poorly drained.—Water is removed from the soil so slowly that the upper 10 to 20 inches has the mottles or dull colors related to wetness. The soils in this class commonly have a slowly permeable layer, have a water table, or receive runoff or seepage, or they are characterized by a combination of these.

Poorly drained.—Water is removed so slowly that either the soil is periodically saturated or the upper 10 inches has the mottles or dull colors related to wetness. The soils in this class commonly have a slowly permeable layer, have a water table, or receive runoff or seepage, or they are characterized by a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water is at or on the surface most of the time. The soils in this class commonly have a slowly permeable layer, have a water table, or receive runoff or seepage, or they are characterized by a combination of these.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial melt water.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water off of cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part of a layer of transition from the overlying A to the underlying C horizon. The B

horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.20 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability or an impermeable layer near the surface, the soil may

not adequately filter effluent from a waste disposal system.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. Following are the slope classes recognized in this survey:

	Percent
Nearly level or gently undulating	0 to 2
Gently sloping or undulating	2 to 6
Moderately sloping	6 to 9
Strongly sloping or rolling	9 to 15
Moderately steep or hilly	15 to 25
Steep	25 to 40
Very steep	more than 40

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 mm in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 40 centimeters) in diameter.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain*

(each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the profile below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Subsurface layer. Any surface soil horizon (A1, A2, or A3) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A horizon. Includes all subdivisions of this horizon (A1, A2, and A3).

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Data were recorded in the period 1951-77 at Pickstown, South Dakota]

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average daily	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	29.8	8.5	19.1	60	-21	9	.36	.10	.56	1	3.7
February---	36.2	14.9	25.6	69	-17	28	.71	.23	1.09	2	5.8
March------	44.3	22.8	33.6	79	-5	107	1.23	.53	1.78	3	5.7
April------	60.6	36.5	48.6	90	15	279	2.25	1.23	3.07	5	.7
May--------	72.6	48.0	60.3	94	28	629	2.97	1.49	4.16	7	.0
June-------	82.2	58.2	70.2	103	41	906	3.98	1.97	5.61	7	.0
July-------	88.7	64.0	76.4	105	48	1,128	2.64	1.10	3.88	5	.0
August-----	87.2	62.3	74.8	102	47	1,079	2.49	1.36	3.40	6	.0
September--	75.9	51.3	63.6	99	32	708	2.28	.80	3.46	4	.0
October----	65.2	40.6	52.9	90	22	412	1.24	.24	2.03	3	.3
November---	47.4	26.1	36.8	77	1	70	.78	.13	1.29	2	3.1
December---	34.4	14.7	24.5	63	-14	16	.62	.21	.94	2	5.9
Yearly:											
Average--	60.4	37.3	48.9	---	---	---	---	---	---	---	---
Extreme--	---	---	---	106	-21	---	---	---	---	---	---
Total----	---	---	---	---	---	5,371	21.55	16.48	25.69	47	25.2

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Data were recorded in the period 1951-77 at Pickstown, South Dakota]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 27	May 29	May 19
2 years in 10 later than--	May 4	May 14	May 13
5 years in 10 later than--	March 21	April 15	May 3
First freezing temperature in fall:			
1 year in 10 earlier than--	October 17	October 4	September 26
2 years in 10 earlier than--	October 21	October 9	October 1
5 years in 10 earlier than--	October 31	October 20	October 11

TABLE 3.--GROWING SEASON

[Data were recorded in the period 1951-77 at Pickstown, South Dakota]

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	161	139	141
8 years in 10	181	156	148
5 years in 10	219	188	161
2 years in 10	262	223	175
1 year in 10	298	244	184

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AaA	Agar silt loam, 0 to 2 percent slopes	9,270	1.3
AaB	Agar silt loam, 2 to 6 percent slopes	14,690	2.1
AaC	Agar silt loam, 6 to 9 percent slopes	1,440	0.2
Ab	Albaton silty clay	2,250	0.3
An	Albaton silty clay, depressional	220	*
Ao	Aowa silty clay loam	2,000	0.3
Ar	Arlo silt loam, wet	210	*
AsA	Arlo-Enet loams, 0 to 2 percent slopes	210	*
BbC	Beadle-Eakin complex, 6 to 9 percent slopes	2,640	0.4
BcA	Beadle-Jerauld complex, 0 to 4 percent slopes	5,345	0.8
BdF	Betts loam, 25 to 40 percent slopes	21,630	3.1
BeE	Betts-Ethan loams, 9 to 25 percent slopes	19,700	2.8
Bn	Bon silt loam	5,310	0.8
Bo	Bon silt loam, channeled	6,890	1.0
BsD	Boyd-Sansarc complex, 6 to 15 percent slopes	5,910	0.8
CeB	Clarno-Ethan loams, 2 to 6 percent slopes	3,495	0.5
CeC	Clarno-Ethan loams, 6 to 9 percent slopes	1,465	0.2
Da	DeGrey-Jerauld silt loams	5,005	0.7
Db	DeGrey-Walke silt loams	19,095	2.7
DmC	Delmont-Talmo complex, 2 to 9 percent slopes	1,180	0.2
DnA	Dorna silt loam, 0 to 4 percent slopes	570	0.1
Du	Durrstein silt loam	575	0.1
EaA	Eakin silt loam, 0 to 2 percent slopes	11,070	1.6
EbB	Eakin-Beadle complex, 2 to 6 percent slopes	7,005	1.0
EdA	Eakin-DeGrey silt loams, 0 to 4 percent slopes	13,975	2.0
EeB	Eakin-Ethan complex, 2 to 6 percent slopes	98,105	14.0
EeC	Eakin-Ethan complex, 6 to 9 percent slopes	43,025	6.1
EmA	Enet loam, 0 to 2 percent slopes	895	0.1
EnC	Enet-Delmont loams, 2 to 9 percent slopes	1,145	0.2
EtD	Ethan-Clarno loams, 9 to 15 percent slopes	16,725	2.4
EuC	Ethan-Homme complex, 6 to 9 percent slopes	4,540	0.6
GsE	Gavins-Sansarc complex, 15 to 25 percent slopes	440	0.1
Gv	Graceville silt loam	555	0.1
HaA	Hand loam, 0 to 2 percent slopes	1,675	0.2
Hb	Haynie silt loam	800	0.1
Hc	Haynie Variant silt loam	1,015	0.1
HeB	Henkin loam, 2 to 6 percent slopes	215	*
HgA	Highmore silt loam, 0 to 2 percent slopes	50,125	7.1
HhB	Highmore-Eakin silt loams, 2 to 6 percent slopes	84,765	12.1
HlA	Highmore-Walke silt loams, 0 to 2 percent slopes	34,480	4.9
HmB	Homme-Ethan-Onita complex, 1 to 6 percent slopes	16,210	2.3
HoA	Homme-Onita silty clay loams, 0 to 2 percent slopes	5,800	0.8
HoB	Homme-Onita silty clay loams, 1 to 6 percent slopes	6,040	0.9
HuA	Houdek loam, 0 to 2 percent slopes	1,190	0.2
HuB	Houdek loam, 2 to 6 percent slopes	965	0.1
Hv	Hoven silt loam	5,385	0.8
InB	Inavale fine sand, 2 to 6 percent slopes	230	*
IvA	Inavale loamy fine sand, 0 to 6 percent slopes	610	0.1
Ix	Inavale Variant loamy fine sand	435	0.1
LaA	Lane silty clay loam, 0 to 2 percent slopes	2,645	0.4
LaB	Lane silty clay loam, 2 to 6 percent slopes	1,285	0.2
LoA	Lowry silt loam, 0 to 2 percent slopes	3,460	0.5
LoB	Lowry silt loam, 2 to 6 percent slopes	3,195	0.5
LoC	Lowry silt loam, 6 to 9 percent slopes	1,390	0.2
LrF	Lowry-Gavins silt loams, 6 to 40 percent slopes	1,325	0.2
LsD	Lowry-Sully silt loams, 9 to 15 percent slopes	690	0.1
MeE	Meadin loam, 15 to 30 percent slopes	315	*
Mo	Mobridge silt loam	4,820	0.7
Mu	Munjor fine sandy loam	920	0.1
OeF	Okaton silty clay, 15 to 40 percent slopes	7,305	1.0
Oh	Onawa fine sandy loam, overwash	270	*
Om	Onawa silty clay	745	0.1
On	Onita silt loam	29,505	4.2
Oo	Onita-Davison complex	850	0.1
Os	Onita-Hoven silt loams	5,540	0.8
Ot	Onita-Tetonka silt loams	26,205	3.7
Pg	Pits, gravel	360	0.1
PoA	Promise silty clay, 0 to 2 percent slopes	1,350	0.2
PoB	Promise silty clay, 2 to 6 percent slopes	2,820	0.4
Pr	Prosper loam	955	0.1

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
Sa	Salmo silty clay loam	3,575	0.5
Sm	Salmo-Napa complex	2,020	0.3
SnF	Sansarc clay, 25 to 70 percent slopes	8,585	1.2
SoF	Sansarc-Boyd complex, 15 to 40 percent slopes	31,735	4.5
SrF	Sansarc-Rock outcrop complex, 15 to 40 percent slopes	680	0.1
SuE	Sully silt loam, 9 to 25 percent slopes	2,750	0.4
TaC	Talmo gravelly sandy loam, 2 to 9 percent slopes	220	*
TbE	Talmo-Betts complex, 9 to 25 percent slopes	440	0.1
Te	Tetonka silt loam	9,020	1.3
Tn	Tetonka-Chancellor silty clay loams	1,270	0.2
Wd	Wendte Variant silty clay	1,060	0.2
Wo	Worthing silty clay loam	4,685	0.7
Wp	Worthing silty clay loam, ponded	3,500	0.5
	Water (<40 acres)	262	*
	Total land area	702,272	100.0
	Open water areas more than 40 acres in size	36,288	
	Total area	738,560	

* Less than 0.1 percent.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Only arable soils are listed. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Corn	Oats	Grain sorghum	Alfalfa hay	Bromegrass-alfalfa
	Bu	Bu	Bu	Ton	AUM*
AaA---- Agar	55	65	60	2.5	4.2
AaB---- Agar	52	62	57	2.4	4.0
AaC---- Agar	44	52	48	2.0	3.3
Ab---- Albaton	50	56	54	3.5	5.8
Ao---- Aowa	65	75	74	3.5	5.8
AsA---- Arlo-Enet	43	47	44	2.6	4.3
BbC---- Beadle-Eakin	42	48	43	2.4	4.0
BcA---- Beadle-Jerauld	32	39	35	1.5	2.5
Bn---- Bon	70	75	75	3.3	5.5
CeB---- Clarno-Ethan	53	60	50	2.6	4.3
CeC---- Clarno-Ethan	45	51	43	2.4	4.0
Da---- DeGrey-Jerauld	20	26	25	.7	1.2
Db---- DeGrey-Walke	32	40	34	1.7	2.8
DmC---- Delmont-Talmo	21	27	26	.6	1.0
DnA---- Dorna	45	50	45	2.5	4.2
EaA---- Eakin	53	60	58	2.7	4.5
EbB---- Eakin-Beadle	50	56	52	2.7	4.5
EdA---- Eakin-DeGrey	43	49	47	2.2	3.7
EeB---- Eakin-Ethan	48	55	50	2.5	4.2
EeC---- Eakin-Ethan	41	49	43	2.2	3.7
EmA---- Enet	42	49	43	2.0	3.3

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Oats	Grain sorghum	Alfalfa hay	Bromegrass-alfalfa
	Bu	Bu	Bu	Ton	AUM*
EnC---- Enet-Delmont	27	40	30	1.3	2.2
EuC---- Ethan-Homme	40	48	38	2.1	3.5
Gv---- Graceville	66	70	70	3.2	5.3
HaA---- Hand	60	65	60	2.7	4.5
Hb---- Haynie	65	67	68	3.4	5.7
Hc---- Haynie Variant	52	53	55	2.8	4.7
HeB---- Henkin	47	45	42	1.8	3.0
HgA---- Highmore	55	64	60	2.7	4.5
HhB---- Highmore-Eakin	52	59	56	2.7	4.5
HlA---- Highmore-Walke	50	60	55	2.5	4.2
HmB---- Homme-Ethan-Onita	56	59	53	2.6	4.3
HoA---- Homme-Onita	65	67	62	3.0	5.0
HoB---- Homme-Onita	62	63	59	2.9	4.8
HuA---- Houdek	57	65	58	2.7	4.5
HuB---- Houdek	55	63	55	2.6	4.3
IvA---- Inavale	30	---	38	1.7	2.8
LaA---- Lane	53	70	54	2.8	4.7
LaB---- Lane	51	65	53	2.8	4.7
LoA---- Lowry	51	53	50	2.3	3.8
LoB---- Lowry	48	50	48	2.2	3.7
LoC---- Lowry	40	47	42	2.0	3.3
Mo---- Mobridge	64	70	70	3.0	5.0
Mu---- Munjor	48	50	50	2.0	3.3

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Oats	Grain sorghum	Alfalfa hay	Bromegrass-alfalfa
	Bu	Bu	Bu	Ton	AUM*
Oh---------- Onawa	65	66	72	3.6	6.0
Om---------- Onawa	67	63	75	3.6	6.0
On---------- Onita	66	70	67	3.1	5.2
Oo---------- Onita-Davison	59	65	58	2.8	4.7
Os---------- Onita-Hoven	45	52	50	1.9	3.2
Ot---------- Onita-Tetonka	61	64	61	3.0	5.0
PoA---------- Promise	33	52	50	1.7	2.8
PoB---------- Promise	31	50	48	1.6	2.7
Pr---------- Prosper	68	71	67	3.0	5.0
Sa---------- Salmo	15	36	30	2.4	4.0
Tn---------- Tetonka-Chancellor	54	53	53	2.9	4.8
Wd---------- Wendte Variant	50	55	60	3.0	5.0

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES

[Only the soils that support rangeland vegetation suitable for grazing are listed]

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
AaA, AaB, AaC---- Agar	Silty----------	Favorable	3,600	Western wheatgrass----------	35
		Normal	3,000	Green needlegrass----------	20
		Unfavorable	2,100	Big bluestem----------	10
				Needleandthread----------	10
				Little bluestem----------	5
				Sideoats grama----------	5
				Blue grama----------	5
				Sedge----------	5
Ab---------- Albaton	Subirrigated----------	Favorable	5,100	Big bluestem----------	40
		Normal	4,600	Indiangrass----------	10
		Unfavorable	3,700	Little bluestem----------	10
				Prairie cordgrass----------	10
				Sedge----------	10
				Switchgrass----------	10
An---------- Albaton	Wetland----------	Favorable	6,000	Prairie cordgrass----------	60
		Normal	5,500	Western wheatgrass----------	15
		Unfavorable	4,400	Kentucky bluegrass----------	10
				Sedge----------	10
Ao---------- Aowa	Overflow----------	Favorable	4,800	Big bluestem----------	45
		Normal	4,000	Little bluestem----------	15
		Unfavorable	2,800	Green needlegrass----------	10
				Western wheatgrass----------	10
				Sideoats grama----------	5
				Leadplant----------	5
				Sedge----------	5
Ar---------- Arlo	Wetland----------	Favorable	7,000	Prairie cordgrass----------	55
		Normal	6,400	Big bluestem----------	15
		Unfavorable	5,200	Sedge----------	15
				Indiangrass----------	5
				Switchgrass----------	5
AsA*:					
Arlo----------	Subirrigated----------	Favorable	4,900	Big bluestem----------	40
		Normal	4,500	Indiangrass----------	15
		Unfavorable	3,600	Switchgrass----------	15
				Prairie cordgrass----------	15
				Sedge----------	10
Enet----------	Silty----------	Favorable	3,600	Needlegrass----------	35
		Normal	3,000	Western wheatgrass----------	20
		Unfavorable	2,100	Little bluestem----------	15
				Big bluestem----------	10
				Sideoats grama----------	5
				Blue grama----------	5
				Sedge----------	5
BbC*:					
Beadle----------	Clayey----------	Favorable	3,200	Western wheatgrass----------	30
		Normal	2,700	Green needlegrass----------	30
		Unfavorable	1,900	Sideoats grama----------	10
				Blue grama----------	10
				Little bluestem----------	5
				Big bluestem----------	5
				Sedge----------	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
BbC*:					
Eakin	Silty	Favorable	3,700	Western wheatgrass	35
		Normal	3,100	Green needlegrass	20
		Unfavorable	2,200	Big bluestem	10
				Needleandthread	10
				Little bluestem	5
				Sideoats grama	5
				Blue grama	5
				Sedge	5
BcA*:					
Beadle	Clayey	Favorable	3,200	Western wheatgrass	30
		Normal	2,700	Green needlegrass	30
		Unfavorable	1,900	Sideoats grama	10
				Blue grama	10
				Little bluestem	5
				Big bluestem	5
				Sedge	5
Jerauld	Thin Claypan	Favorable	1,900	Western wheatgrass	40
		Normal	1,600	Blue grama	30
		Unfavorable	1,000	Buffalograss	10
				Sedge	10
BdF	Thin Upland	Favorable	2,800	Little bluestem	40
Betts		Normal	2,300	Sideoats grama	15
		Unfavorable	1,600	Needleandthread	10
				Blue grama	10
				Prairie dropseed	10
				Sedge	5
				Leadplant	5
BeE*:					
Betts	Thin Upland	Favorable	2,800	Little bluestem	40
		Normal	2,300	Sideoats grama	15
		Unfavorable	1,600	Needleandthread	10
				Blue grama	10
				Prairie dropseed	10
				Sedge	5
				Leadplant	5
Ethan	Silty	Favorable	2,900	Needlegrass	35
		Normal	2,400	Little bluestem	20
		Unfavorable	1,700	Western wheatgrass	15
				Sideoats grama	10
				Big bluestem	5
				Blue grama	5
				Sedge	5
Bn	Overflow	Favorable	4,700	Big bluestem	55
Bon		Normal	4,300	Needlegrass	15
		Unfavorable	3,000	Western wheatgrass	10
				Sideoats grama	5
				Leadplant	5
				Sedge	5
Bo	Subirrigated	Favorable	5,000	Big bluestem	60
Bon		Normal	4,500	Indiangrass	10
		Unfavorable	3,600	Switchgrass	10
				Sedge	5
BsD*:					
Boyd	Clayey	Favorable	3,200	Western wheatgrass	50
		Normal	2,700	Green needlegrass	25
		Unfavorable	1,900	Blue grama	10
				Sideoats grama	5
				Buffalograss	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
BsD*:					
Sansarc	Shallow Clay	Favorable	2,500	Little bluestem	30
		Normal	2,100	Western wheatgrass	20
		Unfavorable	1,500	Green needlegrass	15
				Sideoats grama	10
				Big bluestem	10
				Blue grama	5
				Sedge	5
CeB*:					
Clarno	Silty	Favorable	3,600	Needlegrass	40
		Normal	3,000	Western wheatgrass	20
		Unfavorable	2,100	Big bluestem	15
				Little bluestem	5
				Sideoats grama	5
				Blue grama	5
				Sedge	5
Ethan	Silty	Favorable	3,100	Needlegrass	35
		Normal	2,600	Western wheatgrass	20
		Unfavorable	1,800	Little bluestem	15
				Big bluestem	10
				Sideoats grama	5
				Blue grama	5
				Sedge	5
CeC*:					
Clarno	Silty	Favorable	3,300	Needlegrass	40
		Normal	2,800	Western wheatgrass	20
		Unfavorable	2,000	Big bluestem	10
				Sideoats grama	10
				Little bluestem	5
				Blue grama	5
				Sedge	5
Ethan	Silty	Favorable	3,100	Needlegrass	35
		Normal	2,600	Western wheatgrass	20
		Unfavorable	1,800	Little bluestem	15
				Big bluestem	10
				Sideoats grama	5
				Blue grama	5
				Sedge	5
Da*:					
DeGrey	Claypan	Favorable	2,800	Western wheatgrass	45
		Normal	2,300	Green needlegrass	15
		Unfavorable	1,500	Blue grama	15
				Sedge	10
				Needleandthread	5
				Buffalograss	5
Jerauld	Thin Claypan	Favorable	1,900	Western wheatgrass	40
		Normal	1,600	Blue grama	30
		Unfavorable	1,000	Buffalograss	10
				Sedge	10
Db*:					
DeGrey	Claypan	Favorable	2,800	Western wheatgrass	45
		Normal	2,300	Green needlegrass	15
		Unfavorable	1,500	Blue grama	15
				Sedge	10
				Needleandthread	5
				Buffalograss	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Db*:					
Walke	Clayey	Favorable	3,200	Western wheatgrass	35
		Normal	2,700	Green needlegrass	30
		Unfavorable	1,900	Sideoats grama	10
				Blue grama	10
				Sedge	5
				Little bluestem	5
DmC*:					
Delmont	Shallow to Gravel	Favorable	2,500	Needleandthread	60
		Normal	2,100	Sedge	10
		Unfavorable	1,300	Sideoats grama	5
				Prairie dropseed	5
				Blue grama	5
				Plains muhly	5
Talmo	Very Shallow	Favorable	2,000	Blue grama	40
		Normal	1,700	Needleandthread	25
		Unfavorable	1,000	Sideoats grama	10
				Sedge	10
				Plains muhly	5
DnA	Silty	Favorable	3,400	Western wheatgrass	35
Dorna		Normal	2,800	Green needlegrass	20
		Unfavorable	2,000	Big bluestem	10
				Needleandthread	10
				Little bluestem	5
				Sideoats grama	5
				Blue grama	5
				Sedge	5
Du	Saline Lowland	Favorable	3,600	Western wheatgrass	50
Durrstein		Normal	3,400	Cordgrass	15
		Unfavorable	2,700	Inland saltgrass	15
				Nuttall alkaligrass	10
EaA	Silty	Favorable	3,700	Western wheatgrass	35
Eakin		Normal	3,100	Green needlegrass	20
		Unfavorable	2,200	Big bluestem	10
				Needleandthread	10
				Little bluestem	5
				Sideoats grama	5
				Blue grama	5
				Sedge	5
EbB*:					
Eakin	Silty	Favorable	3,700	Western wheatgrass	35
		Normal	3,100	Green needlegrass	20
		Unfavorable	2,200	Big bluestem	10
				Needleandthread	10
				Little bluestem	5
				Sideoats grama	5
				Blue grama	5
				Sedge	5
Beadle	Clayey	Favorable	3,200	Western wheatgrass	30
		Normal	2,700	Green needlegrass	30
		Unfavorable	1,900	Sideoats grama	10
				Blue grama	10
				Little bluestem	5
				Big bluestem	5
				Sedge	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
EdA*:					
Eakin	Silty	Favorable	3,700	Western wheatgrass	35
		Normal	3,100	Green needlegrass	20
		Unfavorable	2,200	Big bluestem	10
				Needleandthread	10
				Little bluestem	5
				Sideoats grama	5
				Blue grama	5
				Sedge	5
DeGrey	Claypan	Favorable	2,800	Western wheatgrass	45
		Normal	2,300	Green needlegrass	15
		Unfavorable	1,500	Blue grama	15
				Sedge	10
				Needleandthread	5
				Buffalograss	5
EeB*, EeC*:					
Eakin	Silty	Favorable	3,700	Western wheatgrass	35
		Normal	3,100	Green needlegrass	20
		Unfavorable	2,200	Big bluestem	10
				Needleandthread	10
				Little bluestem	5
				Sideoats grama	5
				Blue grama	5
				Sedge	5
Ethan	Silty	Favorable	3,100	Needlegrass	35
		Normal	2,600	Western wheatgrass	20
		Unfavorable	1,800	Little bluestem	15
				Big bluestem	10
				Sideoats grama	5
				Blue grama	5
				Sedge	5
EmA	Silty	Favorable	3,600	Needlegrass	35
Enet		Normal	3,000	Western wheatgrass	20
		Unfavorable	2,100	Little bluestem	15
				Big bluestem	10
				Sideoats grama	5
				Blue grama	5
				Sedge	5
EnC*:					
Enet	Silty	Favorable	3,600	Needlegrass	35
		Normal	3,000	Western wheatgrass	20
		Unfavorable	2,100	Little bluestem	15
				Big bluestem	10
				Sideoats grama	5
				Blue grama	5
				Sedge	5
Delmont	Shallow to Gravel	Favorable	2,500	Needleandthread	60
		Normal	2,100	Sedge	10
		Unfavorable	1,300	Sideoats grama	5
				Prairie dropseed	5
				Blue grama	5
				Plains muhly	5
EtD*:					
Ethan	Silty	Favorable	2,900	Needlegrass	35
		Normal	2,400	Little bluestem	20
		Unfavorable	1,700	Western wheatgrass	15
				Sideoats grama	10
				Big bluestem	5
				Blue grama	5
				Sedge	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
EtD*:					
Clarno	Silty	Favorable	3,300	Needlegrass	40
		Normal	2,800	Western wheatgrass	20
		Unfavorable	2,000	Big bluestem	10
				Sideoats grama	10
				Little bluestem	5
				Blue grama	5
				Sedge	5
EuC*:					
Ethan	Silty	Favorable	3,100	Needlegrass	35
		Normal	2,600	Western wheatgrass	20
		Unfavorable	1,800	Little bluestem	15
				Big bluestem	10
				Sideoats grama	5
				Blue grama	5
				Sedge	5
Homme	Silty	Favorable	3,800	Western wheatgrass	30
		Normal	3,200	Green needlegrass	20
		Unfavorable	2,200	Big bluestem	15
				Needleandthread	10
				Little bluestem	5
				Sideoats grama	5
				Blue grama	5
				Sedge	5
GsE*:					
Gavins	Thin Upland	Favorable	3,000	Little bluestem	20
		Normal	2,500	Western wheatgrass	20
		Unfavorable	1,700	Sideoats grama	15
				Needleandthread	10
				Blue grama	10
				Prairie dropseed	5
				Big bluestem	5
				Sedge	5
Sansarc	Shallow Clay	Favorable	2,500	Little bluestem	30
		Normal	2,100	Western wheatgrass	20
		Unfavorable	1,500	Green needlegrass	15
				Sideoats grama	10
				Big bluestem	10
				Blue grama	5
				Sedge	5
Gv	Silty	Favorable	3,600	Big bluestem	30
Graceville		Normal	3,000	Green needlegrass	20
		Unfavorable	2,100	Needleandthread	15
				Little bluestem	10
				Western wheatgrass	10
				Sideoats grama	5
				Blue grama	5
				Sedge	5
HaA	Silty	Favorable	3,500	Needlegrass	40
Hand		Normal	2,900	Little bluestem	15
		Unfavorable	2,000	Western wheatgrass	15
				Big bluestem	10
				Sideoats grama	5
				Blue grama	5
				Sedge	5
Hb	Silty	Favorable	4,100	Big bluestem	30
Haynie		Normal	3,400	Little bluestem	10
		Unfavorable	2,400	Western wheatgrass	10
				Switchgrass	10
				Indiangrass	10
				Canada wildrye	5
				Sedge	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Hc--	Silty	Favorable	3,700	Western wheatgrass	35
Haynie Variant		Normal	3,100	Green needlegrass	20
		Unfavorable	2,200	Big bluestem	10
				Needleandthread	10
				Little bluestem	5
				Sideoats grama	5
				Blue grama	5
				Sedge	5
HeB--	Sandy	Favorable	3,500	Little bluestem	35
Henkin		Normal	2,900	Prairie sandreed	15
		Unfavorable	2,000	Big bluestem	10
				Needleandthread	10
				Blue grama	10
				Porcupinegrass	5
				Leadplant	5
				Sedge	5
HgA--	Silty	Favorable	3,700	Western wheatgrass	35
Highmore		Normal	3,100	Green needlegrass	20
		Unfavorable	2,200	Big bluestem	10
				Needleandthread	10
				Little bluestem	5
				Sideoats grama	5
				Blue grama	5
				Sedge	5
HhB*:					
Highmore--	Silty	Favorable	3,700	Western wheatgrass	35
		Normal	3,100	Green needlegrass	20
		Unfavorable	2,200	Big bluestem	10
				Needleandthread	10
				Little bluestem	5
				Sideoats grama	5
				Blue grama	5
				Sedge	5
Eakin--	Silty	Favorable	3,700	Western wheatgrass	35
		Normal	3,100	Green needlegrass	20
		Unfavorable	2,200	Big bluestem	10
				Needleandthread	10
				Little bluestem	5
				Sideoats grama	5
				Blue grama	5
				Sedge	5
HlA*:					
Highmore--	Silty	Favorable	3,700	Western wheatgrass	35
		Normal	3,100	Green needlegrass	20
		Unfavorable	2,200	Big bluestem	10
				Needleandthread	10
				Little bluestem	5
				Sideoats grama	5
				Blue grama	5
				Sedge	5
Walke--	Clayey	Favorable	3,200	Western wheatgrass	35
		Normal	2,700	Green needlegrass	30
		Unfavorable	1,900	Sideoats grama	10
				Blue grama	10
				Sedge	5
				Little bluestem	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
HmB*:					
Homme	Silty	Favorable	3,800	Western wheatgrass	30
		Normal	3,200	Green needlegrass	20
		Unfavorable	2,200	Big bluestem	15
				Needleandthread	10
				Little bluestem	5
				Sideoats grama	5
				Blue grama	5
				Sedge	5
Ethan	Silty	Favorable	3,100	Needlegrass	35
		Normal	2,600	Western wheatgrass	20
		Unfavorable	1,800	Little bluestem	15
				Big bluestem	10
				Sideoats grama	5
				Blue grama	5
				Sedge	5
Onita	Overflow	Favorable	5,000	Big bluestem	60
		Normal	4,200	Green needlegrass	10
		Unfavorable	3,000	Western wheatgrass	5
				Sideoats grama	5
				Little bluestem	5
				Leadplant	5
				Sedge	5
HoA*, HoB*:					
Homme	Silty	Favorable	3,800	Western wheatgrass	30
		Normal	3,200	Green needlegrass	20
		Unfavorable	2,200	Big bluestem	15
				Needleandthread	10
				Little bluestem	5
				Sideoats grama	5
				Blue grama	5
				Sedge	5
Onita	Overflow	Favorable	5,000	Big bluestem	60
		Normal	4,200	Green needlegrass	10
		Unfavorable	3,000	Western wheatgrass	5
				Sideoats grama	5
				Little bluestem	5
				Leadplant	5
				Sedge	5
HuA, HuB	Silty	Favorable	3,500	Needlegrass	40
Houdek		Normal	2,900	Big bluestem	15
		Unfavorable	2,000	Little bluestem	15
				Western wheatgrass	10
				Sideoats grama	5
				Blue grama	5
				Sedge	5
Hv	Closed Depression	Favorable	3,900	Western wheatgrass	85
Hoven		Normal	3,500	Sedge	10
		Unfavorable	2,500		
InB, IvA	Sands	Favorable	2,900	Big bluestem	30
Inavale		Normal	2,400	Prairie sandreed	20
		Unfavorable	1,700	Little bluestem	15
				Needleandthread	15
				Porcupinegrass	5
				Sedge	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
LaA, LaB----------	Clayey----------	Favorable	3,300	Western wheatgrass----------	40
Lane		Normal	2,800	Green needlegrass----------	30
		Unfavorable	2,000	Blue grama----------	10
				Big bluestem----------	5
				Sideoats grama----------	5
				Sedge----------	5
LoA, LoB, LoC------	Silty----------	Favorable	3,400	Western wheatgrass----------	35
Lowry		Normal	2,800	Green needlegrass----------	20
		Unfavorable	2,000	Big bluestem----------	10
				Needleandthread----------	10
				Little bluestem----------	5
				Sideoats grama----------	5
				Blue grama----------	5
				Sedge----------	5
LrF*:					
Lowry----------	Silty----------	Favorable	3,400	Western wheatgrass----------	35
		Normal	2,800	Green needlegrass----------	20
		Unfavorable	2,000	Big bluestem----------	10
				Needleandthread----------	10
				Little bluestem----------	5
				Sideoats grama----------	5
				Blue grama----------	5
				Sedge----------	5
Gavins----------	Thin Upland----------	Favorable	3,000	Little bluestem----------	20
		Normal	2,500	Western wheatgrass----------	20
		Unfavorable	1,700	Sideoats grama----------	15
				Needleandthread----------	10
				Blue grama----------	10
				Prairie dropseed----------	5
				Big bluestem----------	5
				Sedge----------	5
LsD*:					
Lowry----------	Silty----------	Favorable	3,400	Western wheatgrass----------	35
		Normal	2,800	Green needlegrass----------	20
		Unfavorable	2,000	Big bluestem----------	10
				Needleandthread----------	10
				Little bluestem----------	5
				Sideoats grama----------	5
				Blue grama----------	5
				Sedge----------	5
Sully----------	Thin Upland----------	Favorable	2,900	Western wheatgrass----------	30
		Normal	2,400	Little bluestem----------	15
		Unfavorable	1,700	Needleandthread----------	15
				Blue grama----------	15
				Sideoats grama----------	10
				Sedge----------	5
MeE----------	Shallow to Gravel----------	Favorable	2,300	Blue grama----------	20
Meadin		Normal	1,700	Prairie sandreed----------	10
		Unfavorable	1,000	Sand bluestem----------	10
				Sand dropseed----------	10
				Needleandthread----------	10
				Little bluestem----------	5
				Sedge----------	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Mo Mobridge	Overflow	Favorable	4,800	Big bluestem	45
		Normal	4,000	Western wheatgrass	20
		Unfavorable	2,800	Green needlegrass	15
				Sideoats grama	5
				Leadplant	5
				Sedge	5
Mu Munjor	Sandy	Favorable	3,400	Little bluestem	25
		Normal	2,800	Prairie sandreed	25
		Unfavorable	2,000	Big bluestem	15
				Needleandthread	15
				Blue grama	5
				Leadplant	5
				Sedge	5
OeF Okaton	Shallow	Favorable	2,800	Little bluestem	40
		Normal	2,300	Sideoats grama	25
		Unfavorable	1,600	Big bluestem	10
				Western wheatgrass	5
				Blue grama	5
				Sedge	5
				Small soapweed	5
Oh, Om Onawa	Subirrigated	Favorable	5,100	Big bluestem	40
		Normal	4,600	Switchgrass	15
		Unfavorable	3,700	Little bluestem	10
				Indiangrass	10
				Prairie cordgrass	10
				Sedge	5
On Onita	Overflow	Favorable	5,000	Big bluestem	60
		Normal	4,200	Green needlegrass	10
		Unfavorable	3,000	Western wheatgrass	5
				Sideoats grama	5
				Little bluestem	5
				Leadplant	5
				Sedge	5
Oo*:					
Onita	Overflow	Favorable	5,000	Big bluestem	60
		Normal	4,200	Green needlegrass	10
		Unfavorable	3,000	Western wheatgrass	5
				Sideoats grama	5
				Little bluestem	5
				Leadplant	5
				Sedge	5
Davison	Limy Subirrigated	Favorable	4,300	Little bluestem	30
		Normal	3,600	Needlegrass	30
		Unfavorable	2,500	Big bluestem	10
				Western wheatgrass	10
				Sideoats grama	5
				Blue grama	5
				Sedge	5
Os*:					
Onita	Overflow	Favorable	5,000	Big bluestem	60
		Normal	4,200	Green needlegrass	10
		Unfavorable	3,000	Western wheatgrass	5
				Sideoats grama	5
				Little bluestem	5
				Leadplant	5
				Sedge	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Os*:					
Hoven	Closed Depression	Favorable	3,900	Western wheatgrass	85
		Normal	3,500	Sedge	10
		Unfavorable	2,500		
Ot*:					
Onita	Overflow	Favorable	5,000	Big bluestem	60
		Normal	4,200	Green needlegrass	10
		Unfavorable	3,000	Western wheatgrass	5
				Sideoats grama	5
				Little bluestem	5
				Leadplant	5
				Sedge	5
Tetonka	Wet Meadow	Favorable	4,800	Sedge	30
		Normal	4,200	Prairie cordgrass	25
		Unfavorable	2,900	Western wheatgrass	15
				Reedgrass	15
				Bluegrass	5
PoA, PoB	Clayey	Favorable	3,200	Western wheatgrass	45
Promise		Normal	2,700	Green needlegrass	30
		Unfavorable	1,900	Sideoats grama	5
				Blue grama	5
				Little bluestem	5
				Sedge	5
Pr	Overflow	Favorable	4,700	Big bluestem	55
Prosper		Normal	4,300	Western wheatgrass	15
		Unfavorable	3,000	Green needlegrass	10
				Sideoats grama	5
				Leadplant	5
				Sedge	5
Sa	Saline Lowland	Favorable	4,400	Cordgrass	35
Salmo		Normal	4,000	Western wheatgrass	20
		Unfavorable	3,200	Nuttall alkaligrass	15
				Switchgrass	5
				Sedge	5
Sm*:					
Salmo	Saline Lowland	Favorable	4,400	Cordgrass	35
		Normal	4,000	Western wheatgrass	20
		Unfavorable	3,200	Nuttall alkaligrass	15
				Switchgrass	5
				Sedge	5
Napa	Saline Lowland	Favorable	3,500	Western wheatgrass	30
		Normal	3,200	Cordgrass	25
		Unfavorable	2,600	Nuttall alkaligrass	20
				Saltgrass	10
				Bluegrass	5
SnF	Shallow Clay	Favorable	2,500	Little bluestem	30
Sansarc		Normal	2,100	Western wheatgrass	20
		Unfavorable	1,500	Green needlegrass	15
				Sideoats grama	10
				Big bluestem	10
				Blue grama	5
				Sedge	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
SoF*:					
Sansarc	Shallow Clay	Favorable	2,500	Little bluestem	30
		Normal	2,100	Western wheatgrass	20
		Unfavorable	1,500	Green needlegrass	15
				Sideoats grama	10
				Big bluestem	10
				Blue grama	5
				Sedge	5
Boyd	Clayey	Favorable	3,200	Western wheatgrass	50
		Normal	2,700	Green needlegrass	25
		Unfavorable	1,900	Blue grama	10
				Sideoats grama	5
				Buffalograss	5
SrF*:					
Sansarc	Shallow Clay	Favorable	2,500	Little bluestem	30
		Normal	2,100	Western wheatgrass	20
		Unfavorable	1,500	Green needlegrass	15
				Sideoats grama	10
				Big bluestem	10
				Blue grama	5
				Sedge	5
Rock outcrop.					
SuE	Thin Upland	Favorable	2,900	Western wheatgrass	30
Sully		Normal	2,400	Little bluestem	15
		Unfavorable	1,700	Needleandthread	15
				Blue grama	15
				Sideoats grama	10
				Sedge	5
TaC	Very Shallow	Favorable	2,000	Blue grama	40
Talmo		Normal	1,700	Needleandthread	25
		Unfavorable	1,000	Sideoats grama	10
				Sedge	10
				Plains muhly	5
TbE*:					
Talmo	Very Shallow	Favorable	2,000	Blue grama	40
		Normal	1,700	Needleandthread	25
		Unfavorable	1,000	Sideoats grama	10
				Sedge	10
				Plains muhly	5
Betts	Thin Upland	Favorable	2,800	Little bluestem	40
		Normal	2,300	Sideoats grama	15
		Unfavorable	1,600	Needleandthread	10
				Blue grama	10
				Prairie dropseed	10
				Sedge	5
				Leadplant	5
Te	Wet Meadow	Favorable	4,800	Sedge	30
Tetonka		Normal	4,200	Prairie cordgrass	25
		Unfavorable	2,900	Western wheatgrass	15
				Reedgrass	15
				Bluegrass	5
Tn*:					
Tetonka	Wet Meadow	Favorable	4,800	Sedge	30
		Normal	4,200	Prairie cordgrass	25
		Unfavorable	2,900	Western wheatgrass	15
				Reedgrass	15
				Bluegrass	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Tn*:					
Chancellor	Overflow	Favorable	4,800	Big bluestem	55
		Normal	4,000	Green needlegrass	10
		Unfavorable	2,800	Western wheatgrass	10
				Indiangrass	5
				Switchgrass	5
				Leadplant	5
				Sedge	5
				Sideoats grama	5
Wd	Overflow	Favorable	4,800	Western wheatgrass	30
Wendte Variant		Normal	4,000	Big bluestem	20
		Unfavorable	2,800	Green needlegrass	15
				Sedge	5
				Blue grama	5
Wo	Shallow Marsh	Favorable	6,800	Slough sedge	35
Worthing		Normal	6,200	Rivergrass	30
		Unfavorable	5,000	Prairie cordgrass	10
				Reedgrass	10

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

[The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil]

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
AaA, AaB, AaC----- Agar	Lilac----------	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce-------	---
Ab---------- Albaton	American plum, lilac.	Common chokecherry, Siberian peashrub, eastern redcedar.	Common hackberry, blue spruce, green ash, ponderosa pine, Siberian crabapple.	Golden willow, eastern cottonwood.	---
An. Albaton					
Ao---------- Aowa	---	Common chokecherry, Siberian peashrub, American plum, lilac.	Green ash, common hackberry, Siberian crabapple, eastern redcedar.	Golden willow, ponderosa pine, blue spruce.	Eastern cottonwood.
Ar. Arlo					
AsA*: Arlo----------	Lilac, American plum.	Eastern redcedar, common chokecherry, Siberian peashrub.	Common hackberry, blue spruce, green ash, ponderosa pine, Siberian crabapple.	Eastern cottonwood, golden willow.	---
Enet----------	Siberian peashrub, Tatarian honeysuckle, silver buffaloberry, Peking cotoneaster, lilac.	Ponderosa pine, green ash, Siberian crabapple, common hackberry, Russian-olive, eastern redcedar.	Siberian elm------	---	---
BbC*: Beadle----------	Peking cotoneaster, lilac.	Siberian crabapple, common chokecherry, American plum, silver buffaloberry, Siberian peashrub.	Green ash, common hackberry, ponderosa pine, Russian-olive, eastern redcedar.	---	---

See footnote at end of table.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
BbC*:					
Eakin	Lilac	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce	---
BcA*:					
Beadle	Peking cotoneaster, lilac.	Siberian crabapple, common chokecherry, American plum, silver buffaloberry, Siberian peashrub.	Green ash, common hackberry, ponderosa pine, Russian-olive, eastern redcedar.	---	---
Jerauld.					
BdF.					
Betts					
BeE*:					
Betts.					
Ethan.					
Bn	---	Common chokecherry, Siberian peashrub, American plum, lilac.	Green ash, common hackberry, Siberian crabapple, eastern redcedar.	Golden willow, ponderosa pine, blue spruce.	Eastern cottonwood.
Bon					
Bo.					
Bon					
BsD*:					
Boyd	Peking cotoneaster, lilac.	Siberian crabapple, common chokecherry, American plum, silver buffaloberry, Siberian peashrub.	Green ash, common hackberry, ponderosa pine, Russian-olive, eastern redcedar.	---	---
Sansarc.					
CeB*, CeC*:					
Clarno	Lilac	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce	---
Ethan	Tatarian honeysuckle, American plum, lilac, Peking cotoneaster.	Ponderosa pine, Russian-olive, green ash, common hackberry, Rocky Mountain juniper, eastern redcedar, Siberian peashrub.	Siberian elm	---	---

See footnote at end of table.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
Da*:					
DeGrey	Eastern redcedar, Rocky Mountain juniper, Siberian peashrub, silver buffaloberry, lilac.	Siberian elm, green ash, ponderosa pine, Russian-olive.	---	---	---
Jerauld.					
Db*:					
DeGrey	Eastern redcedar, Rocky Mountain juniper, Siberian peashrub, silver buffaloberry, lilac.	Siberian elm, green ash, ponderosa pine, Russian-olive.	---	---	---
Walke	Peking cotoneaster, lilac.	Siberian crabapple, common chokecherry, American plum, silver buffaloberry, Siberian peashrub.	Green ash, common hackberry, ponderosa pine, Russian-olive, eastern redcedar.	---	---
DmC*:					
Delmont	Siberian peashrub, Tatarian honeysuckle, silver buffaloberry, Peking cotoneaster, lilac.	Ponderosa pine, green ash, Siberian crabapple, common hackberry, Russian-olive, eastern redcedar.	Siberian elm	---	---
Talmo.					
DnA Dorna	Lilac	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce	---
Du Durrstein	Silver buffaloberry, Tatarian honeysuckle, lilac.	Eastern redcedar, Rocky Mountain juniper, Russian-olive, Siberian peashrub.	Siberian elm, green ash.	---	---
EaA Eakin	Lilac	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce	---
EbB*:					
Eakin	Lilac	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce	---

See footnote at end of table.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
EbB*:					
Beadle	Peking cotoneaster, lilac.	Siberian crabapple, common chokecherry, American plum, silver buffaloberry, Siberian peashrub.	Green ash, common hackberry, ponderosa pine, Russian-olive, eastern redcedar.	---	---
EdA*:					
Eakin	Lilac	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce	---
DeGrey	Eastern redcedar, Rocky Mountain juniper, Siberian peashrub, silver buffaloberry, lilac.	Siberian elm, green ash, ponderosa pine, Russian-olive.	---	---	---
EeB*, EeC*:					
Eakin	Lilac	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce	---
Ethan	Tatarian honeysuckle, American plum, lilac, Peking cotoneaster.	Ponderosa pine, Russian-olive, green ash, common hackberry, Rocky Mountain juniper, eastern redcedar, Siberian peashrub.	Siberian elm	---	---
EmA	Siberian peashrub,	Ponderosa pine,	Siberian elm	---	---
Enet	Tatarian honeysuckle, silver buffaloberry, Peking cotoneaster, lilac.	green ash, Siberian crabapple, common hackberry, Russian-olive, eastern redcedar.			
EnC*:					
Enet	Siberian peashrub, Tatarian honeysuckle, silver buffaloberry, Peking cotoneaster, lilac.	Ponderosa pine, green ash, Siberian crabapple, common hackberry, Russian-olive, eastern redcedar.	Siberian elm	---	---

See footnote at end of table.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
EnC*: Delmont	Siberian peashrub, Tatarian honeysuckle, silver buffaloberry, Peking cotoneaster, lilac.	Ponderosa pine, green ash, Siberian crabapple, common hackberry, Russian-olive, eastern redcedar.	Siberian elm	---	---
EtD*: Ethan.					
Clarno	Lilac	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce	---
EuC*: Ethan	Tatarian honeysuckle, American plum, lilac, Peking cotoneaster.	Ponderosa pine, Russian-olive, green ash, common hackberry, Rocky Mountain juniper, eastern redcedar, Siberian peashrub.	Siberian elm	---	---
Homme	Lilac	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce	---
GsE*: Gavins.					
Sansarc.					
Gv Graceville	Lilac	Eastern redcedar, common chokecherry, Siberian peashrub, silver buffaloberry, American plum.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce	---
HaA Hand	Lilac	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce	---
Hb, Hc Haynie	Lilac	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce	---

See footnote at end of table.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
HeB---------- Henkin	Silver buffaloberry, Peking cotoneaster, lilac, American plum.	Eastern redcedar, common chokecherry, Siberian peashrub.	Green ash, common hackberry, ponderosa pine, Siberian crabapple, Russian-olive.	---	---
HgA---------- Highmore	Lilac----------	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce-------	---
HhB*: Highmore---------	Lilac----------	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce-------	---
Eakin----------	Lilac----------	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce-------	---
HlA*: Highmore---------	Lilac----------	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce-------	---
Walke----------	Peking cotoneaster, lilac.	Siberian crabapple, common chokecherry, American plum, silver buffaloberry, Siberian peashrub.	Green ash, common hackberry, ponderosa pine, Russian-olive, eastern redcedar.	---	---
HmB*: Homme----------	Lilac----------	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce-------	---

See footnote at end of table.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
HmB*:					
Ethan	Tatarian honeysuckle, American plum, lilac, Peking cotoneaster.	Ponderosa pine, Russian-olive, green ash, common hackberry, Rocky Mountain juniper, eastern redcedar, Siberian peashrub.	Siberian elm	---	---
Onita	---	Common chokecherry, Siberian peashrub, American plum, lilac.	Green ash, common hackberry, Siberian crabapple, eastern redcedar.	Golden willow, ponderosa pine, blue spruce.	Eastern cottonwood.
HoA*, HoB*:					
Homme	Lilac	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce	---
Onita	---	Common chokecherry, Siberian peashrub, American plum, lilac.	Green ash, common hackberry, Siberian crabapple, eastern redcedar.	Golden willow, ponderosa pine, blue spruce.	Eastern cottonwood.
HuA, HuB Houdek	Lilac	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce	---
Hv. Hoven					
InB, IvA Inavale	---	Ponderosa pine, eastern redcedar, Rocky Mountain juniper.	---	---	---
Ix. Inavale Variant					
LaA, LaB Lane	Lilac	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce	---

See footnote at end of table.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
LoA, LoB, LoC----- Lowry	Lilac----------	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce-------	---
LrF*: Lowry----------	Lilac----------	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce-------	---
Gavins.					
LsD*: Lowry----------	Lilac----------	Eastern redcedar, common chokecherry, Siberian peashrub, American plum, silver buffaloberry.	Ponderosa pine, green ash, common hackberry, Russian-olive, Siberian crabapple.	Blue spruce-------	---
Sully----------	Tatarian honeysuckle, American plum, lilac, Peking cotoneaster.	Ponderosa pine, Russian-olive, green ash, common hackberry, Rocky Mountain juniper, eastern redcedar, Siberian peashrub.	Siberian elm------	---	---
MeE. Meadin					
Mo---------- Mobridge	---	Common chokecherry, Siberian peashrub, American plum, lilac.	Green ash, common hackberry, Siberian crabapple, eastern redcedar.	Golden willow, ponderosa pine, blue spruce.	Eastern cottonwood.
Mu---------- Munjor	Peking cotoneaster, American plum, lilac.	Eastern redcedar, common chokecherry, Siberian peashrub.	Siberian crabapple, ponderosa pine, Russian-olive, green ash, common hackberry.	Eastern cottonwood	---
OeF. Okaton					
Oh, Om---------- Onawa	Redosier dogwood	Common chokecherry, American plum.	Common hackberry, eastern redcedar.	Golden willow, green ash, Austrian pine, silver maple, honeylocust.	Eastern cottonwood.
On---------- Onita	---	Common chokecherry, Siberian peashrub, American plum, lilac.	Green ash, common hackberry, Siberian crabapple, eastern redcedar.	Golden willow, ponderosa pine, blue spruce.	Eastern cottonwood.

See footnote at end of table.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
Oo*:					
Onita	---	Common chokecherry, Siberian peashrub, American plum, lilac.	Green ash, common hackberry, Siberian crabapple, eastern redcedar.	Golden willow, ponderosa pine, blue spruce.	Eastern cottonwood.
Davison	---	Common chokecherry, Siberian peashrub, American plum, lilac.	Green ash, common hackberry, Siberian crabapple, eastern redcedar.	Golden willow, ponderosa pine, blue spruce.	Eastern cottonwood.
Os*:					
Onita	---	Common chokecherry, Siberian peashrub, American plum, lilac.	Green ash, common hackberry, Siberian crabapple, eastern redcedar.	Golden willow, ponderosa pine, blue spruce.	Eastern cottonwood.
Hoven.					
Ot*:					
Onita	---	Common chokecherry, Siberian peashrub, American plum, lilac.	Green ash, common hackberry, Siberian crabapple, eastern redcedar.	Golden willow, ponderosa pine, blue spruce.	Eastern cottonwood.
Tetonka	Lilac, American plum.	Eastern redcedar, common chokecherry, Siberian peashrub.	Common hackberry, blue spruce, green ash, ponderosa pine, Siberian crabapple.	Eastern cottonwood, golden willow.	---
Pg*.					
Pits					
PoA, PoB	Peking cotoneaster, lilac.	Siberian crabapple, common chokecherry, American plum, silver buffaloberry, Siberian peashrub.	Green ash, common hackberry, ponderosa pine, Russian-olive, eastern redcedar.	---	---
Pr	---	Common chokecherry, Siberian peashrub, American plum, lilac.	Blue spruce, green ash, common hackberry, Siberian crabapple, eastern redcedar.	Golden willow, ponderosa pine.	Eastern cottonwood.
Sa	Silver buffaloberry, Tatarian honeysuckle, lilac.	Eastern redcedar, Rocky Mountain juniper, Russian-olive, Siberian peashrub.	Siberian elm, green ash.	---	---
Salmo					

See footnote at end of table.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
Sm*:					
Salmo	Silver buffaloberry, Tatarian honeysuckle, lilac.	Eastern redcedar, Rocky Mountain juniper, Russian-olive, Siberian peashrub.	Siberian elm, green ash.	---	---
Napa	Silver buffaloberry, Tatarian honeysuckle, lilac.	Eastern redcedar, Rocky Mountain juniper, Russian-olive, Siberian peashrub.	Siberian elm, green ash.	---	---
SnF.					
Sansarc					
SoF*:					
Sansarc.					
Boyd.					
SrF*:					
Sansarc.					
Rock outcrop.					
SuE.					
Sully					
TaC.					
Talmo					
TbE*:					
Talmo.					
Betts.					
Te.					
Tetonka					
Tn*:					
Tetonka	Lilac, American plum.	Eastern redcedar, common chokecherry, Siberian peashrub.	Common hackberry, blue spruce, green ash, ponderosa pine, Siberian crabapple.	Eastern cottonwood, golden willow.	---
Chancellor	Lilac, American plum.	Eastern redcedar, common chokecherry, Siberian peashrub.	Common hackberry, blue spruce, green ash, ponderosa pine, Siberian crabapple.	Eastern cottonwood, golden willow.	---
Wd	Lilac, American plum.	Eastern redcedar, common chokecherry, Siberian peashrub.	Common hackberry, blue spruce, green ash, ponderosa pine, Siberian crabapple.	Eastern cottonwood, golden willow.	---
Wendte Variant					
Wo, Wp.					
Worthing					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
AaA---- Agar	Slight	Slight	Slight	Slight.
AaB---- Agar	Slight	Slight	Moderate: slope.	Slight.
AaC---- Agar	Slight	Slight	Severe: slope.	Slight.
Ab---- Albaton	Severe: flooding, wetness, percs slowly.	Severe: too clayey, percs slowly.	Severe: too clayey, wetness, percs slowly.	Severe: too clayey.
An---- Albaton	Severe: flooding, ponding, too clayey.	Severe: ponding, too clayey.	Severe: too clayey, ponding, flooding.	Severe: ponding, too clayey.
Ao---- Aowa	Slight	Slight	Slight	Slight.
Ar---- Arlo	Severe: ponding, wetness.	Severe: wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.
AsA*: Arlo----	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Enet----	Slight	Slight	Moderate: small stones.	Slight.
BbC*: Beadle----	Slight	Slight	Severe: slope.	Slight.
Eakin----	Slight	Slight	Severe: slope.	Slight.
BcA*: Beadle----	Slight	Slight	Moderate: slope.	Slight.
Jerauld----	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
BdF---- Betts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
BeE*: Betts----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Ethan----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Bn---- Bon	Severe: flooding.	Slight	Moderate: flooding.	Slight.
Bo---- Bon	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: flooding.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
BsD*:				
Boyd	Moderate: percs slowly, too clayey.	Moderate: too clayey, percs slowly.	Severe: slope.	Severe: erodes easily.
Sansarc	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
CeB*:				
Clarno	Slight	Slight	Moderate: slope.	Slight.
Ethan	Slight	Slight	Moderate: slope.	Slight.
CeC*:				
Clarno	Slight	Slight	Severe: slope.	Slight.
Ethan	Slight	Slight	Severe: slope.	Slight.
)a*:				
DeGrey	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
Jerauld	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
)b*:				
DeGrey	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
Walke	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
)mC*:				
Delmont	Slight	Slight	Moderate: slope.	Slight.
Talmo	Moderate: small stones.	Moderate: small stones.	Severe; slope, small stones.	Slight.
DnA Dorna	Slight	Slight	Slight	Slight.
Du Durrstein	Severe: flooding, wetness, percs slowly.	Severe: wetness, excess sodium, excess salt.	Severe: wetness, percs slowly.	Severe: wetness.
EaA Eakin	Slight	Slight	Slight	Slight.
EbB*:				
Eakin	Slight	Slight	Moderate: slope.	Slight.
Beadle	Slight	Slight	Moderate: slope.	Slight.
EdA*:				
Eakin	Slight	Slight	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
EdA*:				
DeGrey	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
EeB*:				
Eakin	Slight	Slight	Moderate: slope.	Slight.
Ethan	Slight	Slight	Moderate: slope.	Slight.
EeC*:				
Eakin	Slight	Slight	Severe: slope.	Slight.
Ethan	Slight	Slight	Severe: slope.	Slight.
EmA	Slight	Slight	Moderate: small stones.	Slight.
Enet				
EnC*:				
Enet	Slight	Slight	Moderate: slope, small stones.	Slight.
Delmont	Slight	Slight	Severe: slope.	Slight.
EtD*:				
Ethan	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Clarno	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
EuC*:				
Ethan	Slight	Slight	Severe: slope.	Slight.
Homme	Slight	Slight	Severe: slope.	Slight.
GsE*:				
Gavins	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
Sansarc	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
Gv	Slight	Slight	Slight	Slight.
Graceville				
HaA	Slight	Slight	Slight	Slight.
Hand				
Hb	Slight	Slight	Slight	Slight.
Haynie				
Hc	Slight	Slight	Slight	Slight.
Haynie Variant				
HeB	Slight	Slight	Moderate: slope.	Slight.
Henkin				

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
HgA---- Highmore	Slight----	Slight----	Slight----	Slight.
HhB*:				
Highmore----	Slight----	Slight----	Moderate: slope.	Slight.
Eakin----	Slight----	Slight----	Moderate: slope.	Slight.
HlA*:				
Highmore----	Slight----	Slight----	Slight----	Slight.
Walke----	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
HmB*:				
Homme----	Slight----	Slight----	Moderate: slope.	Slight.
Ethan----	Slight----	Slight----	Moderate: slope.	Slight.
Onita----	Severe: flooding.	Slight----	Moderate: flooding.	Slight.
HoA*:				
Homme----	Slight----	Slight----	Slight----	Slight.
Onita----	Severe: flooding.	Slight----	Moderate: flooding.	Slight.
HoB*:				
Homme----	Slight----	Slight----	Moderate: slope.	Slight.
Onita----	Severe: flooding.	Slight----	Moderate: flooding.	Slight.
HuA---- Houdek	Slight----	Slight----	Slight----	Slight.
HuB---- Houdek	Slight----	Slight----	Moderate: slope.	Slight.
Hv---- Hoven	Severe: ponding, percs slowly.	Severe: ponding, excess sodium, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.
InB---- Inavale	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
IvA---- Inavale	Slight----	Slight----	Moderate: slope.	Slight.
Ix---- Inavale Variant	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.
LaA---- Lane	Slight----	Slight----	Slight----	Slight.
LaB---- Lane	Slight----	Slight----	Moderate: slope.	Slight.
LoA---- Lowry	Slight----	Slight----	Slight----	Slight.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
LoB---------- Lowry	Slight----------	Slight----------	Moderate: slope.	Slight.
LoC---------- Lowry	Slight----------	Slight----------	Severe: slope.	Slight.
LrF*:				
Lowry----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Gavins----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
LsD*:				
Lowry----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Sully----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.
MeE---------- Meadin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Mo---------- Mobridge	Severe: flooding.	Slight----------	Slight----------	Slight.
Mu---------- Munjor	Slight----------	Slight----------	Slight----------	Slight.
OeF---------- Okaton	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
Oh---------- Onawa	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight.
Om---------- Onawa	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
On---------- Onita	Severe: flooding.	Slight----------	Moderate: flooding.	Slight.
Oo*:				
Onita----------	Severe: flooding.	Slight----------	Moderate: flooding.	Slight.
Davison----------	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.
Os*:				
Onita----------	Severe: flooding.	Slight----------	Moderate: flooding.	Slight.
Hoven----------	Severe: ponding, percs slowly.	Severe: ponding, excess sodium, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.
Ot*:				
Onita----------	Severe: flooding.	Slight----------	Moderate: flooding.	Slight.
Tetonka----------	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Pg*. Pits				
PoA---------- Promise	Moderate: percs slowly.	Moderate: too clayey, percs slowly.	Moderate: too clayey, percs slowly.	Severe: erodes easily.
PoB---------- Promise	Moderate: percs slowly.	Moderate: too clayey, percs slowly.	Moderate: slope, too clayey, percs slowly.	Severe: erodes easily.
Pr---------- Prosper	Severe: flooding.	Slight----------	Moderate: flooding.	Slight.
Sa---------- Salmo	Severe: flooding, wetness, excess salt.	Severe: wetness, excess salt.	Severe: wetness, flooding, excess salt.	Severe: wetness.
Sm*: Salmo----------	Severe: flooding, wetness, excess salt.	Severe: wetness, excess salt.	Severe: wetness, flooding, excess salt.	Severe: wetness.
Napa----------	Severe: flooding, wetness, percs slowly.	Severe: wetness, excess sodium, percs slowly.	Severe: wetness, flooding, percs slowly.	Severe: wetness.
SnF---------- Sansarc	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
SoF*: Sansarc----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
Boyd----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
SrF*: Sansarc----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
Rock outcrop.				
SuE---------- Sully	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
TaC---------- Talmo	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight.
TbE*: Talmo----------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
Betts----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Te---------- Tetonka	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Tn*:				
Tetonka	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.
Chancellor	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.
Wd Wendte Variant	Severe: flooding, too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Wo, Wp Worthing	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Wetland wildlife	Rangeland wildlife
AaA, AaB---------- Agar	Good	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
AaC---------- Agar	Fair	Good	Good	Fair	Very poor	Very poor	Fair	Very poor	Good.
Ab---------- Albaton	Fair	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair.
An---------- Albaton	Very poor	Poor	Fair	Poor	Good	Good	Very poor	Good	Fair.
Ao---------- Aowa	Good	Good	Fair	Good	Very poor	Very poor	Good	Very poor	Fair.
Ar---------- Arlo	Very poor	Poor	Fair	Poor	Fair	Fair	Very poor	Fair	Fair.
AsA*:									
Arlo----------	Fair	Poor	Fair	Good	Fair	Fair	Fair	Fair	Fair.
Enet----------	Fair	Fair	Good	Poor	Very poor	Very poor	Fair	Very poor	Good.
BbC*:									
Beadle----------	Poor	Fair	Good	Fair	Very poor	Very poor	Poor	Very poor	Good.
Eakin----------	Fair	Good	Good	Fair	Very poor	Very poor	Fair	Very poor	Good.
BcA*:									
Beadle----------	Fair	Fair	Good	Fair	Very poor	Very poor	Fair	Very poor	Good.
Jerauld----------	Very poor	Poor	Poor	Poor	Very poor	Very poor	Very poor	Very poor	Poor.
BdF---------- Betts	Very poor	Very poor	Fair	Poor	Very poor	Very poor	Very poor	Very poor	Fair.
BeE*:									
Betts----------	Very poor	Poor	Fair	Poor	Very poor	Very poor	Very poor	Very poor	Fair.
Ethan----------	Very poor	Fair	Good	Poor	Very poor	Very poor	Very poor	Very poor	Good.
Bn---------- Bon	Good	Good	Fair	Good	Very poor	Very poor	Good	Very poor	Fair.
Bo---------- Bon	Very poor	Good	Fair	Poor	Very poor	Very poor	Poor	Very poor	Fair.
BsD*:									
Boyd----------	Poor	Fair	Good	Fair	Very poor	Very poor	Poor	Very poor	Good.
Sansarc----------	Very poor	Very poor	Fair	Poor	Very poor	Very poor	Very poor	Very poor	Fair.
CeB*:									
Clarno----------	Good	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
Ethan----------	Fair	Fair	Good	Poor	Very poor	Very poor	Fair	Very poor	Good.
CeC*:									
Clarno----------	Fair	Good	Good	Fair	Very poor	Very poor	Fair	Very poor	Good.
Ethan----------	Poor	Fair	Good	Poor	Very poor	Very poor	Poor	Very poor	Good.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Wetland wildlife	Rangeland wildlife
Da*:									
DeGrey	Poor	Fair	Fair	Poor	Very poor	Very poor	Poor	Very poor	Fair.
Jerauld	Very poor	Poor	Poor	Poor	Very poor	Very poor	Very poor	Very poor	Poor.
Db*:									
DeGrey	Poor	Fair	Fair	Poor	Very poor	Very poor	Poor	Very poor	Fair.
Walke	Fair	Fair	Good	Fair	Very poor	Very poor	Fair	Very poor	Good.
DmC*:									
Delmont	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Very poor	Poor.
Talmo	Very poor	Very poor	Poor	Poor	Very poor	Very poor	Very poor	Very poor	Poor.
DnA Dorna	Good	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
Du Durrstein	Very poor	Poor	Fair	Poor	Poor	Fair	Very poor	Poor	Fair.
EaA Eakin	Good	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
EbB*:									
Eakin	Good	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
Beadle	Fair	Fair	Good	Fair	Very poor	Very poor	Fair	Very poor	Good.
EdA*:									
Eakin	Good	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
DeGrey	Poor	Fair	Fair	Poor	Very poor	Very poor	Poor	Very poor	Fair.
EeB*:									
Eakin	Good	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
Ethan	Fair	Fair	Good	Poor	Very poor	Very poor	Fair	Very poor	Good.
EeC*:									
Eakin	Fair	Good	Good	Fair	Very poor	Very poor	Fair	Very poor	Good.
Ethan	Poor	Fair	Good	Poor	Very poor	Very poor	Poor	Very poor	Good.
EmA Enet	Fair	Fair	Good	Poor	Very poor	Very poor	Fair	Very poor	Good.
EnC*:									
Enet	Fair	Fair	Good	Poor	Very poor	Very poor	Fair	Very poor	Good.
Delmont	Very poor	Fair	Poor	Poor	Very poor	Very poor	Very poor	Very poor	Poor.
EtD*:									
Ethan	Very poor	Fair	Good	Poor	Very poor	Very poor	Very poor	Very poor	Good.
Clarno	Poor	Good	Good	Poor	Very poor	Very poor	Poor	Very poor	Good.
EuC*:									
Ethan	Poor	Fair	Good	Poor	Very poor	Very poor	Poor	Very poor	Good.
Homme	Fair	Good	Good	Fair	Very poor	Very poor	Fair	Very poor	Good.
GsE*:									
Gavins	Very poor	Very poor	Fair	Poor	Very poor	Very poor	Very poor	Very poor	Fair.
Sansarc	Very poor	Very poor	Fair	Poor	Very poor	Very poor	Very poor	Very poor	Fair.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Wetland wildlife	Rangeland wildlife
Gv---- Graceville	Good	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
HaA---- Hand	Good	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
Hb---- Haynie	Good	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good
Hc---- Haynie Variant	Good	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
HeB---- Henkin	Fair	Fair	Good	Fair	Very poor	Very poor	Fair	Very poor	Good.
HgA---- Highmore	Good	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
HhB*:									
Highmore----	Good	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
Eakin----	Good	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
HlA*:									
Highmore----	Good	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
Walke----	Fair	Fair	Good	Fair	Very poor	Very poor	Fair	Very poor	Good.
HmB*:									
Homme----	Good	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
Ethan----	Fair	Fair	Good	Poor	Very poor	Very poor	Fair	Very poor	Good.
Onita----	Good	Good	Fair	Good	Very poor	Very poor	Good	Very poor	Fair.
HoA*, HoB*:									
Homme----	Good	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
Onita----	Good	Good	Fair	Good	Very poor	Very poor	Good	Very poor	Fair.
HuA, HuB---- Houdek	Good	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
Hv---- Hoven	Very poor	Poor	Poor	Poor	Fair	Fair	Very poor	Fair	Poor.
InB---- Inavale	Very poor	Fair	Fair	Poor	Very poor	Very poor	Very poor	Very poor	Fair.
IvA---- Inavale	Poor	Fair	Fair	Poor	Very poor	Very poor	Poor	Very poor	Fair.
Ix---- Inavale Variant	Very poor	Very poor	Very poor	Very poor	Good	Good	Very poor	Good	Very poor.
LaA---- Lane	Good	Fair	Good	Good	Very poor	Very poor	Good	Very poor	Good.
LaB---- Lane	Fair	Fair	Good	Good	Very poor	Very poor	Fair	Very poor	Good.
LoA, LoB---- Lowry	Good	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
LoC---- Lowry	Fair	Good	Good	Fair	Very poor	Very poor	Fair	Very poor	Good.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Wetland wildlife	Rangeland wildlife
LrF*:									
Lowry	Poor	Good	Good	Poor	Very poor	Very poor	Poor	Very poor	Good.
Gavins	Very poor	Very poor	Fair	Poor	Very poor	Very poor	Very poor	Very poor	Fair.
LsD*:									
Lowry	Poor	Good	Good	Poor	Very poor	Very poor	Poor	Very poor	Good.
Sully	Very poor	Fair	Fair	Poor	Very poor	Very poor	Very poor	Very poor	Fair.
MeE Meadin	Very poor	Very poor	Poor	Poor	Very poor	Very poor	Very poor	Very poor	Poor.
Mo Mobridge	Good	Good	Fair	Good	Very poor	Very poor	Good	Very poor	Fair.
Mu Munjor	Fair	Fair	Good	Good	Very poor	Very poor	Fair	Very poor	Good.
OeF Okaton	Very poor	Very poor	Fair	Poor	Very poor	Very poor	Very poor	Very poor	Fair.
Oh, Om Onawa	Good	Good	Fair	Good	Fair	Fair	Good	Fair	Fair.
On Onita	Good	Good	Fair	Good	Very poor	Very poor	Good	Very poor	Fair.
Oo*:									
Onita	Good	Good	Fair	Good	Very poor	Very poor	Good	Very poor	Fair.
Davison	Good	Good	Good	Good	Poor	Poor	Good	Poor	Good.
Os*:									
Onita	Good	Good	Fair	Good	Very poor	Very poor	Good	Very poor	Fair.
Hoven	Very poor	Poor	Poor	Poor	Fair	Fair	Very poor	Fair	Poor.
Ot*:									
Onita	Good	Good	Fair	Good	Very poor	Very poor	Good	Very poor	Fair.
Tetonka	Good	Good	Fair	Good	Fair	Fair	Good	Fair	Fair.
Pg*. Pits									
PoA, PoB Promise	Fair	Fair	Good	Fair	Very poor	Very poor	Fair	Very poor	Good.
Pr Prosper	Good	Good	Fair	Good	Very poor	Very poor	Good	Very poor	Fair.
Sa Salmo	Very poor	Poor	Fair	Poor	Fair	Fair	Very poor	Fair	Fair.
Sm*:									
Salmo	Very poor	Poor	Fair	Poor	Fair	Fair	Very poor	Fair	Fair.
Napa	Very poor	Very poor	Fair	Poor	Poor	Poor	Very poor	Poor	Fair.
SnF Sansarc	Very poor	Very poor	Fair	Poor	Very poor	Very poor	Very poor	Very poor	Fair.
SoF*:									
Sansarc	Very poor	Very poor	Fair	Poor	Very poor	Very poor	Very poor	Very poor	Fair.
Boyd	Very poor	Very poor	Good	Poor	Very poor	Very poor	Very poor	Very poor	Good.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Wetland wildlife	Rangeland wildlife
SrF*:									
Sansarc	Very poor	Very poor	Fair	Poor	Very poor	Very poor	Very poor	Very poor	Fair.
Rock outcrop.									
SuE:									
Sully	Very poor	Fair	Fair	Poor	Very poor	Very poor	Very poor	Very poor	Fair.
TaC:									
Talmo	Very poor	Very poor	Poor	Poor	Very poor	Very poor	Very poor	Very poor	Poor.
TbE*:									
Talmo	Very poor	Very poor	Poor	Poor	Very poor	Very poor	Very poor	Very poor	Poor.
Betts	Very poor	Poor	Fair	Poor	Very poor	Very poor	Very poor	Very poor	Fair.
Te:									
Tetonka	Poor	Poor	Fair	Fair	Fair	Fair	Poor	Fair	Fair.
Tn*:									
Tetonka	Good	Good	Fair	Good	Fair	Fair	Good	Fair	Fair.
Chancellor	Good	Good	Fair	Good	Poor	Poor	Good	Poor	Fair.
Wd:									
Wendte Variant	Fair	Good	Fair	Good	Poor	Poor	Good	Poor	Fair.
Wo:									
Worthing	Very poor	Poor	Fair	Poor	Good	Good	Very poor	Good	Fair.
Wp:									
Worthing	Very poor	Very poor	Very poor	Very poor	Good	Good	Very poor	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
AaA---- Agar	Slight----	Slight----	Slight----	Slight----	Severe: low strength.
AaB, AaC---- Agar	Slight----	Slight----	Slight----	Moderate: slope.	Severe: low strength.
Ab---- Albaton	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, flooding, shrink-swell.
An---- Albaton	Severe: ponding, flooding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, flooding.
Ao---- Aowa	Slight----	Slight----	Slight----	Slight----	Severe: low strength, frost action.
Ar---- Arlo	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.
AsA*: Arlo----	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.
Enet----	Severe: cutbanks cave.	Slight----	Slight----	Slight----	Slight.
BbC*: Beadle----	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Eakin----	Slight----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.
BcA*: Beadle----	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Jerauld----	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
BdF---- Betts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
BeE*: Betts----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Ethan----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Bn Bon	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Bo Bon	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action.
BsD*:					
Boyd	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Sansarc	Severe: depth to rock.	Severe: shrink-swell.	Severe: shrink-swell, depth to rock.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength.
CeB*, CeC*:					
Clarno	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.
Ethan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.
Da*:					
DeGrey	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Jerauld	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Db*:					
DeGrey	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Walke	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
DmC*:					
Delmont	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
Talmo	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
DnA Dorna	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Du Durrstein	Severe: wetness.	Severe: flooding, shrink-swell, wetness.	Severe: flooding, shrink-swell, wetness.	Severe: flooding, shrink-swell, wetness.	Severe: low strength, wetnes.
EaA Eakin	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
EbB*:					
Eakin	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
EbB*:					
Beadle	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
EdA*:					
Eakin	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.
DeGrey	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
EeB*, EeC*:					
Eakin	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.
Ethan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.
EmA	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
Enet					
EnC*:					
Enet	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
Delmont	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
EtD*:					
Ethan	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.
Clarno	Moderate: slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.
EuC*:					
Ethan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.
Homme	Slight	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
GsE*:					
Gavins	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.
Sansarc	Severe: slope, depth to rock.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell, depth to rock.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell, low strength.
Gv	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.
Graceville					
HaA	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Moderate: low strength, frost action.
Hand					

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Hb---------- Haynie	Slight----------	Slight----------	Slight----------	Slight----------	Severe: low strength, frost action.
Hc---------- Haynie Variant	Slight----------	Slight----------	Slight----------	Slight----------	Severe: low strength.
HeB---------- Henkin	Slight----------	Slight----------	Slight----------	Moderate: slope.	Moderate: frost action.
HgA---------- Highmore	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
HhB*: Highmore---------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Eakin----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.
HlA*: Highmore---------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Walke----------	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
HmB*: Homme----------	Slight----------	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Ethan----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.
Onita----------	Moderate: too clayey, wetness, flooding.	Severe: flooding, shrink-swell.	Severe: flooding.	Severe: flooding, shrink-swell.	Severe: low strength, flooding, frost action.
HoA*, HoB*: Homme----------	Slight----------	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Onita----------	Moderate: too clayey, wetness, flooding.	Severe: flooding, shrink-swell.	Severe: flooding.	Severe: flooding, shrink-swell.	Severe: low strength, flooding, frost action.
HuA---------- Houdek	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
HuB---------- Houdek	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Hv---------- Hoven	Severe: ponding.	Severe: shrink-swell, ponding.	Severe: shrink-swell, ponding.	Severe: shrink-swell, ponding.	Severe: ponding, low strength.
InB---------- Inavale	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
IvA---------- Inavale	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Slight.
Ix---------- Inavale Variant	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.
LaA, LaB---------- Lane	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
LoA---------- Lowry	Slight----------	Slight----------	Slight----------	Slight----------	Moderate: frost action, low strength.
LoB, LoC---------- Lowry	Slight----------	Slight----------	Slight----------	Moderate: slope.	Moderate: frost action, low strength.
LrF*: Lowry----------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action, low strength.
Gavins----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.
LsD*: Lowry----------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action, low strength.
Sully----------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: frost action, low strength, slope.
MeE---------- Meadin	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Mo---------- Mobridge	Slight----------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength.
Mu---------- Munjor	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Slight.
OeF---------- Okaton	Severe: slope, depth to rock.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope, depth to rock.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.
Oh, Om---------- Onawa	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength, frost action.
On---------- Onita	Moderate: too clayey, wetness, flooding.	Severe: flooding, shrink-swell.	Severe: flooding.	Severe: flooding, shrink-swell.	Severe: low strength, flooding, frost action.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Oo*:					
Onita	Moderate: too clayey, wetness, flooding.	Severe: flooding, shrink-swell.	Severe: flooding.	Severe: flooding, shrink-swell.	Severe: low strength, flooding, frost action.
Davison	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: frost action.
Os*:					
Onita	Moderate: too clayey, wetness, flooding.	Severe: flooding, shrink-swell.	Severe: flooding.	Severe: flooding, shrink-swell.	Severe: low strength, flooding, frost action.
Hoven	Severe: ponding.	Severe: shrink-swell, ponding.	Severe: shrink-swell, ponding.	Severe: shrink-swell, ponding.	Severe: ponding, low strength.
Ot*:					
Onita	Moderate: too clayey, wetness, flooding.	Severe: flooding, shrink-swell.	Severe: flooding.	Severe: flooding, shrink-swell.	Severe: low strength, flooding, frost action.
Tetonka	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: shrink-swell, ponding.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, frost action.
Pg*. Pits					
PoA, PoB Promise	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Pr Prosper	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.
Sa Salmo	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.
Sm*:					
Salmo	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.
Napa	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.
SnF Sansarc	Severe: slope, depth to rock.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell, depth to rock.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell, low strength.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
SoF*:					
Sansarc	Severe: slope, depth to rock.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell, depth to rock.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell, low strength.
Boyd	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.
SrF*:					
Sansarc	Severe: slope, depth to rock.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell, depth to rock.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell, low strength.
Rock outcrop.					
SuE Sully	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
TaC Talmo	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
TbE*:					
Talmo	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Betts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Te Tetonka	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: shrink-swell, ponding.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, frost action.
Tn*:					
Tetonka	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: shrink-swell, ponding.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, frost action.
Chancellor	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, flooding, wetness.
Wd Wendte Variant	Moderate: too clayey, wetness, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: low strength, flooding, frost action.
Wo Worthing	Severe: ponding.	Severe: shrink-swell, ponding.	Severe: shrink-swell, ponding.	Severe: shrink-swell, ponding.	Severe: low strength, ponding, frost action.
Wp Worthing	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, frost action.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AaA---- Agar	Slight----	Moderate: seepage.	Slight----	Slight----	Good.
AaB---- Agar	Slight----	Moderate: slope, seepage.	Slight----	Slight----	Good.
AaC---- Agar	Slight----	Severe: slope.	Slight----	Slight----	Good.
Ab---- Albaton	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
An---- Albaton	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, ponding.
Ao---- Aowa	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight----	Fair: too clayey.
Ar---- Arlo	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: too sandy, small stones, ponding.
AsA*:					
Arlo----	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: too sandy, small stones, wetness.
Enet----	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
BbC*:					
Beadle----	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Slight----	Poor: too clayey, hard to pack.
Eakin----	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight----	Fair: too clayey.
BcA*:					
Beadle----	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight----	Poor: too clayey, hard to pack.
Jerauld----	Severe: percs slowly.	Slight----	Severe: too clayey, excess sodium.	Slight----	Poor: too clayey, hard to pack, excess sodium.
BdF---- Betts	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
BeE*:					
Betts	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Ethan	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Bn	Severe: flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Severe: flooding.	Good.
Bon					
Bo	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: wetness.
Bon					
BsD*:					
Boyd	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, hard to pack.
Sansarc	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, hard to pack.
CeB*:					
Clarno	Severe: percs slowly.	Moderate: slope, seepage.	Slight	Slight	Good.
Ethan	Severe: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Good.
CeC*:					
Clarno	Severe: percs slowly.	Severe: slope.	Slight	Slight	Good.
Ethan	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Good.
Da*:					
DeGrey	Severe: percs slowly.	Slight	Severe: excess sodium.	Slight	Poor: hard to pack, excess sodium.
Jerauld	Severe: percs slowly.	Slight	Severe: too clayey, excess sodium.	Slight	Poor: too clayey, hard to pack, excess sodium.
Db*:					
DeGrey	Severe: percs slowly.	Slight	Severe: excess sodium.	Slight	Poor: hard to pack, excess sodium.
Walke	Severe: percs slowly.	Slight	Severe: too clayey, excess sodium.	Slight	Poor: too clayey, hard to pack, excess sodium.
DmC*:					
Delmont	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: small stones, seepage, too sandy.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
DmC*:					
Talmo	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
DnA	Severe: percs slowly.	Moderate: seepage.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Dorna					
Du	Severe: percs slowly, wetness.	Slight	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Durrstein					
EaA	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
Eakin					
EbB*:					
Eakin	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Beadle	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
EdA*:					
Eakin	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
DeGrey	Severe: percs slowly.	Slight	Severe: excess sodium.	Slight	Poor: hard to pack, excess sodium.
EeB*:					
Eakin	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Ethan	Severe: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Good.
EeC*:					
Eakin	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Ethan	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Good.
EmA	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Enet					
EnC*:					
Enet	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Delmont	Severe: poor filter.	Severe: slope, seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: small stones, seepage, too sandy.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
EtD*:					
Ethan	Severe: percs slowly.	Severe: slope.	Moderate: too clayey, slope.	Moderate: slope.	Fair: slope.
Clarno	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
EuC*:					
Ethan	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Good.
Homme	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
GsE*:					
Gavins	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, hard to pack, slope.
Sansarc	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, area reclaim, hard to pack.
Gv Graceville	Slight	Severe: seepage.	Severe: seepage.	Slight	Fair: too clayey, thin layer.
HaA Hand	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
Hb Haynie	Slight	Moderate: seepage.	Slight	Slight	Good.
Hc Haynie Variant	Slight	Moderate: seepage.	Slight	Slight	Good.
HeB Henkin	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
HgA Highmore	Severe: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
HhB*:					
Highmore	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Eakin	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
HlA*:					
Highmore	Severe: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
Walke	Severe: percs slowly.	Slight	Severe: too clayey, excess sodium.	Slight	Poor: too clayey, hard to pack, excess sodium.
HmB*:					
Homme	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
HmB*:					
Ethan	Severe: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Good.
Onita	Severe: flooding, wetness, percs slowly.	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
HoA*:					
Homme	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
Onita	Severe: flooding, wetness, percs slowly.	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
HoB*:					
Homme	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Onita	Severe: flooding, wetness, percs slowly.	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
HuA Houdek	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
HuB Houdek	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Hv Hoven	Severe: percs slowly, ponding.	Slight	Severe: too clayey, ponding.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
InB, IvA Inavale	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Ix Inavale Variant	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
LaA Lane	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
LaB Lane	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
LoA Lowry	Slight	Moderate: seepage.	Slight	Slight	Good.
LoB Lowry	Slight	Moderate: slope, seepage.	Slight	Slight	Good.
LoC Lowry	Slight	Severe: slope.	Slight	Slight	Good.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
LrF*:					
Lowry	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Gavins	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, hard to pack, slope.
LsD*:					
Lowry	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Sully	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
MeE Meadin	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Mo Mobridge	Moderate: flooding.	Moderate: seepage.	Moderate: flooding.	Moderate: flooding.	Fair: too clayey.
Mu Munjor	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: thin layer.
OeF Okaton	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: hard to pack, area reclaim, slope.
Oh, Om Onawa	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Fair: wetness.
On Onita	Severe: flooding, wetness, percs slowly.	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
Oo*:					
Onita	Severe: flooding, wetness, percs slowly.	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
Davison	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: wetness.
Os*:					
Onita	Severe: flooding, wetness, percs slowly.	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
Hoven	Severe: percs slowly, ponding.	Slight	Severe: too clayey, ponding.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Ot*:					
Onita	Severe: flooding, wetness, percs slowly.	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Fair: too clayey.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ot*: Tetonka	Severe: percs slowly, ponding.	Slight	Severe: ponding, too clayey.	Severe: ponding.	Poor: ponding, too clayey, hard to pack.
Pg*. Pits					
PoA Promise	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
PoB Promise	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Pr Prosper	Severe: flooding, wetness, percs slowly.	Slight	Severe: flooding.	Severe: flooding.	Fair: too clayey, wetness.
Sa Salmo	Severe: flooding, wetness, percs slowly.	Slight	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Sm*: Salmo	Severe: flooding, wetness, percs slowly.	Slight	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Napa	Severe: flooding, wetness, percs slowly.	Slight	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
SnF Sansarc	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, area reclaim, hard to pack.
SoF*: Sansarc	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, area reclaim, hard to pack.
Boyd	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, hard to pack, slope.
SrF*: Sansarc	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, area reclaim, hard to pack.
Rock outcrop.					
SuE Sully	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
TaC---------- Talmo	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
TbE*: Talmo----------	Severe: slope, poor filter.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Betts----------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Te---------- Tetonka	Severe: percs slowly, ponding.	Slight----------	Severe: ponding, too clayey.	Severe: ponding.	Poor: ponding, too clayey, hard to pack.
Tn*: Tetonka----------	Severe: percs slowly, ponding.	Slight----------	Severe: ponding, too clayey.	Severe: ponding.	Poor: ponding, too clayey, hard to pack.
Chancellor---------	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
Wd---------- Wendte Variant	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack.
Wo---------- Worthing	Severe: percs slowly, ponding.	Slight----------	Severe: too clayey, ponding.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Wp---------- Worthing	Severe: percs slowly, ponding.	Severe: ponding.	Severe: too clayey, ponding.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AaA, AaB, AaC--------- Agar	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Ab---------- Albaton	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
An---------- Albaton	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Ao---------- Aowa	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Ar---------- Arlo	Poor: wetness.	Probable----------	Probable----------	Poor: area reclaim, wetness.
AsA*: Arlo----------	Poor: wetness.	Probable----------	Probable----------	Poor: area reclaim, wetness.
Enet----------	Good----------	Probable----------	Probable----------	Poor: small stones, area reclaim.
BbC*: Beadle----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Eakin----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
BcA*: Beadle----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Jerauld----------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
BdF---------- Betts	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
BeE*: Betts----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Ethan----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Bn---------- Bon	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Bo---------- Bon	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
BsD*:				
Boyd	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Sansarc	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, area reclaim.
CeB*, CeC*:				
Clarno	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Da*:				
DeGrey	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
Jerauld	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
Db*:				
DeGrey	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
Walke	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
DmC*:				
Delmont	Good	Probable	Probable	Poor: small stones, area reclaim.
Talmo	Good	Probable	Probable	Poor: small stones, area reclaim.
DnA Dorna	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
Du Durrstein	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, wetness, excess sodium.
EaA Eakin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
EbB*:				
Eakin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
Beadle	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
EdA*:				
Eakin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
DeGrey	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
EeB*, EeC*:				
Eakin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
EmA Enet	Good	Probable	Probable	Poor: small stones, area reclaim.
EnC*:				
Enet	Good	Probable	Probable	Poor: small stones, area reclaim.
Delmont	Good	Probable	Probable	Poor: small stones, area reclaim.
EtD*:				
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, small stones.
Clarno	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, small stones.
EuC*:				
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Homme	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
GsE*:				
Gavins	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Sansarc	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey, area reclaim.
Gv Graceville	Good	Probable	Probable	Good.
HaA Hand	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Hb Haynie	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Hc Haynie Variant	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
HeB Henkin	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
HgA Highmore	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
HhB*:				
Highmore	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
HhB*:				
Eakin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
HlA*:				
Highmore	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Walke	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
HmB*:				
Homme	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Onita	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
HoA*, HoB*:				
Homme	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Onita	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
HuA, HuB Houdek	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Hv Hoven	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess sodium.
InB Inavale	Good	Probable	Improbable: too sandy.	Poor: too sandy.
IvA Inavale	Good	Probable	Improbable: too sandy.	Fair: too sandy.
Ix Inavale Variant	Poor: wetness.	Probable	Improbable: too sandy.	Poor: thin layer, wetness.
LaA, LaB Lane	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
LoA, LoB, LoC Lowry	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
LrF*:				
Lowry	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Gavins	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
LsD*:				
Lowry	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Sully	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
MeE---------- Meadin	Fair: slope.	Probable----------	Probable----------	Poor: small stones, area reclaim, slope.
Mo---------- Mobridge	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Mu---------- Munjor	Good----------	Probable----------	Improbable: too sandy.	Good.
OeF---------- Okaton	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope, area reclaim.
Oh, Om---------- Onawa	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
On---------- Onita	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Oo*: Onita----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Davison----------	Fair: wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Os*: Onita----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Hoven----------	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess sodium.
Ot*: Onita----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Tetonka----------	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, thin layer.
Pg*. Pits				
PoA, PoB---------- Promise	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Pr---------- Prosper	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Sa---------- Salmo	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, wetness.
Sm*: Salmo----------	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, wetness.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Sm*:				
Napa	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess sodium.
SnF:				
Sansarc	Poor: slope, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey, area reclaim.
SoF*:				
Sansarc	Poor: slope, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey, area reclaim.
Boyd	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
SrF*:				
Sansarc	Poor: slope, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey, area reclaim.
Rock outcrop.				
SuE:				
Sully	Fair: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
TaC:				
Talmo	Good	Probable	Probable	Poor: small stones, area reclaim.
TbE*:				
Talmo	Fair: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
Betts	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Te:				
Tetonka	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, thin layer.
Tn*:				
Tetonka	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, thin layer.
Chancellor	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Wd:				
Wendte Variant	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Wo---------- Worthing	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Wp---------- Worthing	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
AaA---- Agar	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable------	Erodes easily	Erodes easily.
AaB, AaC---- Agar	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope----------	Erodes easily	Erodes easily.
Ab---- Albaton	Slight---------	Severe: hard to pack, wetness.	Percs slowly, flooding.	Wetness, slow intake, percs slowly.	Not needed-----	Not needed.
An---- Albaton	Slight---------	Severe: ponding.	Ponding, percs slowly, flooding.	Ponding, flooding, slow intake.	Not needed-----	Not needed.
Ao---- Aowa	Moderate: seepage.	Severe: piping.	Deep to water	Favorable------	Erodes easily	Erodes easily.
Ar---- Arlo	Severe: seepage.	Severe: ponding, seepage.	Ponding, frost action, cutbanks cave.	Ponding--------	Not needed-----	Not needed.
AsA*: Arlo----	Severe: seepage.	Severe: wetness, seepage.	Flooding, frost action, cutbanks cave.	Wetness, flooding.	Wetness, too sandy.	Wetness.
Enet----	Severe: seepage.	Severe: seepage.	Deep to water	Favorable------	Too sandy------	Favorable.
BbC*: Beadle----	Moderate: slope.	Moderate: hard to pack.	Deep to water	Slope, percs slowly.	Erodes easily	Erodes easily, percs slowly.
Eakin----	Moderate: seepage, slope.	Moderate: hard to pack.	Deep to water	Slope----------	Erodes easily	Erodes easily.
BcA*: Beadle----	Moderate: slope.	Moderate: hard to pack.	Deep to water	Slope, percs slowly.	Erodes easily	Erodes easily, percs slowly.
Jerauld----	Slight---------	Severe: hard to pack, excess sodium.	Deep to water	Percs slowly, excess sodium.	Percs slowly, erodes easily.	Excess sodium, droughty, erodes easily.
BdF---- Betts	Severe: slope.	Slight---------	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
BeE*: Betts----	Severe: slope.	Slight---------	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Ethan----	Severe: slope.	Slight---------	Deep to water	Slope----------	Slope, erodes easily.	Slope, erodes easily.
Bn---- Bon	Moderate: seepage.	Moderate: piping.	Deep to water	Flooding-------	Favorable------	Favorable.
Bo---- Bon	Moderate: seepage.	Moderate: piping.	Flooding, frost action.	Wetness, flooding.	Wetness--------	Favorable.
BsD*: Boyd----	Moderate: depth to rock, slope.	Severe: hard to pack.	Deep to water	Droughty, slow intake, percs slowly.	Depth to rock, erodes easily.	Erodes easily, droughty.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
BsD*:						
Sansarc	Severe: depth to rock, slope.	Slight	Deep to water	Slow intake, droughty, percs slowly.	Slope, depth to rock, percs slowly.	Slope, droughty, erodes easily.
CeB*, CeC*:						
Clarno	Moderate: seepage, slope.	Slight	Deep to water	Slope	Erodes easily	Erodes easily.
Ethan	Moderate: seepage, slope.	Slight	Deep to water	Slope	Erodes easily	Erodes easily.
Da*:						
DeGrey	Slight	Severe: hard to pack, excess sodium.	Deep to water	Percs slowly, excess sodium.	Erodes easily	Excess sodium, erodes easily, percs slowly.
Jerauld	Slight	Severe: hard to pack, excess sodium.	Deep to water	Percs slowly, excess sodium.	Percs slowly, erodes easily.	Excess sodium, droughty, erodes easily.
Db*:						
DeGrey	Slight	Severe: hard to pack, excess sodium.	Deep to water	Percs slowly, excess sodium.	Erodes easily	Excess sodium, erodes easily, percs slowly.
Walke	Slight	Severe: hard to pack, excess sodium.	Deep to water	Percs slowly, excess sodium.	Percs slowly	Excess sodium, percs slowly.
DmC*:						
Delmont	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, slope.	Too sandy	Droughty.
Talmo	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, slope.	Too sandy	Droughty.
DnA Dorna	Moderate: seepage.	Severe: hard to pack.	Deep to water	Percs slowly	Percs slowly	Percs slowly.
Du Durrstein	Slight	Severe: hard to pack, wetness, excess sodium.	Percs slowly, excess salt.	Wetness, droughty, percs slowly.	Wetness, percs slowly, erodes easily.	Excess sodium, excess salt, wetness.
EaA Eakin	Moderate: seepage.	Moderate: hard to pack.	Deep to water	Favorable	Erodes easily	Erodes easily.
EbB*:						
Eakin	Moderate: seepage, slope.	Moderate: hard to pack.	Deep to water	Slope	Erodes easily	Erodes easily.
Beadle	Moderate: slope.	Moderate: hard to pack.	Deep to water	Slope, percs slowly.	Erodes easily	Erodes easily, percs slowly.
EdA*:						
Eakin	Moderate: seepage, slope.	Moderate: hard to pack.	Deep to water	Slope	Erodes easily	Erodes easily.
DeGrey	Slight	Severe: hard to pack, excess sodium.	Deep to water	Percs slowly, excess sodium.	Erodes easily	Excess sodium, erodes easily, percs slowly.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
EeB*, EeC*:						
Eakin	Moderate: seepage, slope.	Moderate: hard to pack.	Deep to water	Slope	Erodes easily	Erodes easily.
Ethan	Moderate: seepage, slope.	Slight	Deep to water	Slope	Erodes easily	Erodes easily.
EmA	Severe: seepage.	Severe: seepage.	Deep to water	Favorable	Too sandy	Favorable.
Enet						
EnC*:						
Enet	Severe: seepage.	Severe: seepage.	Deep to water	Slope	Too sandy	Favorable.
Delmont	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, slope.	Too sandy	Droughty.
EtD*:						
Ethan	Severe: slope.	Slight	Deep to water	Slope	Slope, erodes easily.	Slope, erodes easily.
Clarno	Severe: slope.	Slight	Deep to water	Slope	Slope, erodes easily.	Slope, erodes easily.
EuC*:						
Ethan	Moderate: seepage, slope.	Slight	Deep to water	Slope	Erodes easily	Erodes easily.
Homme	Moderate: slope.	Moderate: piping.	Deep to water	Slope	Favorable	Favorable.
GsE*:						
Gavins	Severe: depth to rock, slope.	Severe: hard to pack.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Sansarc	Severe: depth to rock, slope.	Slight	Deep to water	Slow intake, droughty, percs slowly.	Slope, depth to rock, percs slowly.	Slope, droughty, erodes easily.
Gv	Moderate: seepage.	Moderate: thin layer, piping.	Deep to water	Favorable	Favorable	Favorable.
Graceville						
HaA	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
Hand						
Hb	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Favorable	Favorable.
Haynie						
Hc	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Favorable	Favorable.
Haynie Variant						
HeB	Severe: seepage.	Severe: piping.	Deep to water	Slope	Favorable	Favorable.
Henkin						
HgA	Moderate: seepage.	Moderate: thin layer, piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Highmore						
HhB*:						
Highmore	Moderate: seepage, slope.	Moderate: thin layer, piping.	Deep to water	Slope	Erodes easily	Erodes easily.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
HhB*:						
Eakin	Moderate: seepage, slope.	Moderate: hard to pack.	Deep to water	Slope	Erodes easily	Erodes easily.
HlA*:						
Highmore	Moderate: seepage.	Moderate: thin layer, piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Walke	Slight	Severe: hard to pack, excess sodium.	Deep to water	Percs slowly, excess sodium.	Percs slowly	Excess sodium, percs slowly.
HmB*:						
Homme	Moderate: slope.	Moderate: piping.	Deep to water	Slope	Favorable	Favorable.
Ethan	Moderate: seepage, slope.	Slight	Deep to water	Slope	Erodes easily	Erodes easily.
Onita	Slight	Moderate: hard to pack.	Flooding, frost action.	Wetness, flooding.	Erodes easily	Erodes easily.
HoA*:						
Homme	Slight	Moderate: piping.	Deep to water	Favorable	Favorable	Favorable.
Onita	Slight	Moderate: hard to pack.	Flooding, frost action.	Wetness, flooding.	Erodes easily	Erodes easily.
HoB*:						
Homme	Moderate: slope.	Moderate: piping.	Deep to water	Slope	Favorable	Favorable.
Onita	Slight	Moderate: hard to pack.	Flooding, frost action.	Wetness, flooding.	Erodes easily	Erodes easily.
HuA, Houdek	Slight	Slight	Deep to water	Favorable	Erodes easily	Erodes easily.
HuB, Houdek	Moderate: slope.	Slight	Deep to water	Slope	Erodes easily	Erodes easily.
Hv, Hoven	Slight	Severe: hard to pack, ponding, excess sodium.	Percs slowly, ponding, excess salt.	Ponding, percs slowly, excess sodium.	Wetness, percs slowly, erodes easily.	Percs slowly, wetness, excess sodium.
InB, IvA, Inavale	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
Ix, Inavale Variant	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, frost action, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
LaA, Lane	Slight	Moderate: hard to pack.	Deep to water	Percs slowly	Erodes easily, percs slowly.	Erodes easily, percs slowly.
LaB, Lane	Moderate: slope.	Moderate: hard to pack.	Deep to water	Percs slowly, slope.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
LoA, Lowry	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
LoB, LoC---------- Lowry	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Erodes easily	Erodes easily.
LrF*:						
Lowry----------	Severe: slope.	Severe: piping.	Deep to water	Slope----------	Slope, erodes easily.	Slope, erodes easily.
Gavins----------	Severe: depth to rock, slope.	Severe: hard to pack.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
LsD*:						
Lowry----------	Severe: slope.	Severe: piping.	Deep to water	Slope----------	Slope, erodes easily.	Slope, erodes easily.
Sully----------	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily, slope.	Slope, erodes easily.
MeE---------- Meadin	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, too sandy.	Slope, droughty.
Mo---------- Mobridge	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable------	Erodes easily	Erodes easily.
Mu---------- Munjor	Severe: seepage.	Severe: piping.	Deep to water	Favorable------	Soil blowing---	Favorable.
OeF---------- Okaton	Severe: depth to rock, slope.	Severe: hard to pack.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Oh---------- Onawa	Severe: seepage.	Severe: piping.	Frost action---	Wetness--------	Not needed-----	Not needed.
Om---------- Onawa	Severe: seepage.	Severe: piping.	Frost action---	Wetness, slow intake, percs slowly.	Not needed-----	Not needed.
On---------- Onita	Slight---------	Moderate: hard to pack.	Flooding, frost action.	Wetness, flooding.	Erodes easily	Erodes easily.
Oo*:						
Onita----------	Slight---------	Moderate: hard to pack.	Flooding, frost action.	Wetness, flooding.	Erodes easily	Erodes easily.
Davison----------	Moderate: seepage.	Severe: piping.	Frost action---	Wetness--------	Wetness, erodes easily.	Erodes easily.
Os*:						
Onita----------	Slight---------	Moderate: hard to pack.	Flooding, frost action.	Wetness, flooding.	Erodes easily	Erodes easily.
Hoven----------	Slight---------	Severe: hard to pack, ponding, excess sodium.	Percs slowly, ponding, excess salt.	Ponding, percs slowly, excess sodium.	Wetness, percs slowly, erodes easily.	Percs slowly, wetness, excess sodium.
Ot*:						
Onita----------	Slight---------	Moderate: hard to pack.	Flooding, frost action.	Wetness, flooding.	Erodes easily	Erodes easily.
Tetonka----------	Slight---------	Severe: ponding, hard to pack.	Percs slowly, ponding, frost action.	Percs slowly, ponding.	Ponding, percs slowly.	Wetness, percs slowly.
Pg*. Pits						

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
PoA---------- Promise	Slight---------	Severe: hard to pack.	Deep to water	Slow intake, percs slowly, droughty.	Percs slowly, erodes easily.	Erodes easily, droughty.
PoB---------- Promise	Moderate: slope.	Severe: hard to pack.	Deep to water	Slow intake, percs slowly, droughty.	Percs slowly, erodes easily.	Erodes easily, droughty.
Pr---------- Prosper	Slight---------	Slight---------	Deep to water	Flooding-------	Erodes easily	Erodes easily.
Sa---------- Salmo	Slight---------	Severe: wetness.	Percs slowly, flooding, frost action.	Wetness, flooding, excess salt.	Wetness, percs slowly.	Wetness, excess salt, percs slowly.
Sm*: Salmo----------	Slight---------	Severe: wetness.	Percs slowly, flooding, frost action.	Wetness, flooding, excess salt.	Wetness, percs slowly.	Wetness, excess salt, percs slowly.
Napa----------	Slight---------	Severe: hard to pack, wetness, excess sodium.	Percs slowly, flooding, excess salt.	Wetness, percs slowly, flooding.	Wetness, percs slowly.	Wetness, excess sodium, percs slowly.
SnF---------- Sansarc	Severe: depth to rock, slope.	Slight---------	Deep to water	Slow intake, droughty, percs slowly.	Slope, depth to rock, percs slowly.	Slope, droughty, erodes easily.
SoF*: Sansarc----------	Severe: depth to rock, slope.	Slight---------	Deep to water	Slow intake, droughty, percs slowly.	Slope, depth to rock, percs slowly.	Slope, droughty, erodes easily.
Boyd----------	Severe: slope.	Severe: hard to pack.	Deep to water	Droughty, slow intake, percs slowly.	Slope, depth to rock, erodes easily.	Slope, erodes easily, droughty.
SrF*: Sansarc----------	Severe: depth to rock, slope.	Slight---------	Deep to water	Slow intake, droughty, percs slowly.	Slope, depth to rock, percs slowly.	Slope, droughty, erodes easily.
Rock outcrop.						
SuE---------- Sully	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily, slope.	Slope, erodes easily.
TaC---------- Talmo	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, slope.	Too sandy------	Droughty.
TbE*: Talmo----------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, too sandy.	Slope, droughty.
Betts----------	Severe: slope.	Slight---------	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Te---------- Tetonka	Slight---------	Severe: ponding, hard to pack.	Percs slowly, ponding, frost action.	Percs slowly, ponding.	Ponding, percs slowly.	Wetness, percs slowly.
Tn*: Tetonka----------	Slight---------	Severe: ponding, hard to pack.	Percs slowly, ponding, frost action.	Percs slowly, ponding.	Ponding, percs slowly.	Wetness, percs slowly.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Tn*: Chancellor	Slight	Severe: hard to pack.	Percs slowly, flooding, frost action.	Wetness, percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.
Wd--Wendte Variant	Slight	Severe: hard to pack.	Deep to water	Slow intake, percs slowly, flooding.	Percs slowly	Percs slowly.
Wo--Worthing	Slight	Severe: hard to pack, ponding.	Ponding, frost action, percs slowly.	Ponding, percs slowly.	Ponding, percs slowly, erodes easily.	Wetness, percs slowly.
Wp--Worthing	Slight	Severe: hard to pack, ponding.	Percs slowly, ponding, frost action.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AaA, AaB, AaC---- Agar	0-6	Silt loam--------	ML, CL	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	5-20
	6-18	Silty clay loam, silt loam.	CL, ML	A-6, A-7	0	100	100	95-100	90-100	35-50	10-25
	18-38	Silty clay loam, silt loam.	CL, ML	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	5-20
	38-60	Silt loam, silty clay loam, clay loam.	ML, CL	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	5-20
Ab---------- Albaton	0-9	Silty clay-------	CH	A-7	0	100	100	95-100	95-100	60-85	40-60
	9-60	Stratified clay to silt.	CH	A-7	0	100	100	95-100	95-100	60-85	40-60
An---------- Albaton	0-7	Silty clay-------	CH	A-7	0	100	100	95-100	95-100	60-85	40-60
	7-60	Stratified clay to silt.	CH	A-7	0	100	100	95-100	95-100	60-85	40-60
Ao---------- Aowa	0-8	Silty clay loam	CL, ML	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	8-20
	8-60	Stratified silt loam and silty clay loam.	CL-ML, CL, ML	A-4, A-6	0	100	100	85-100	70-100	22-40	3-20
Ar---------- Arlo	0-7	Silt loam--------	ML, CL	A-4, A-6	0-5	100	95-100	85-100	60-85	30-40	5-15
	7-20	Loam, clay loam	ML, CL	A-4, A-6, A-7	0-5	100	95-100	85-100	60-80	30-45	5-20
	20-49	Loam, sandy clay loam, silty clay loam.	ML, CL, SC, SM	A-4, A-6, A-7	0-5	100	95-100	80-100	45-85	30-45	5-20
	49-60	Gravelly sand, loamy sand, gravelly loam.	GM, SM, GP-GM, SP-SM	A-2, A-1, A-3	0-5	60-100	50-75	40-65	5-35	<25	NP-7
AsA*:											
Arlo----------	0-9	Loam----------	ML, CL	A-4, A-6	0-5	100	95-100	85-100	60-85	30-40	5-15
	9-16	Loam, clay loam	ML, CL	A-4, A-6, A-7	0-5	100	95-100	85-100	60-80	30-45	5-20
	16-39	Loam, sandy clay loam, clay loam.	ML, CL, SC, SM	A-4, A-6, A-7	0-5	100	95-100	80-100	45-75	30-45	5-20
	39-60	Gravelly sand, loamy sand, gravelly loamy sand.	GM, SM, GP-GM, SP-SM	A-2, A-1, A-3	0-5	60-100	50-75	40-65	5-35	<25	NP-7
Enet----------	0-7	Loam----------	ML, CL	A-4, A-6	0	90-100	85-100	70-95	55-80	30-40	5-15
	7-26	Loam, clay loam, sandy clay loam.	CL, ML, SC, SM	A-4, A-6	0	90-100	85-100	70-95	45-75	30-40	5-15
	26-30	Loam, fine sandy loam, sandy loam.	ML, CL, SM, SC	A-4, A-6	0	90-100	85-95	60-95	40-75	20-40	3-15
	30-60	Gravelly loamy sand, gravelly sand.	SW, SW-SM, SM, SM-SC	A-1, A-2, A-3	0	60-95	45-85	10-60	0-15	<25	NP-5
BbC*:											
Beadle----------	0-6	Loam----------	CL, ML	A-6, A-7	0-5	95-100	95-100	85-100	65-95	30-50	10-20
	6-30	Clay loam, clay	CL, CH	A-7	0-5	90-100	85-100	75-100	55-95	40-60	15-35
	30-60	Clay loam, clay	CL, CH, ML, MH	A-6, A-7	0-5	90-100	85-100	75-95	55-85	35-55	15-25

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
BbC*:											
Eakin	0-7	Silt loam	ML, CL	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	5-20
	7-29	Silty clay loam, silt loam.	CL, ML	A-6, A-7	0	100	95-100	95-100	80-100	35-50	10-25
	29-60	Clay loam, loam, clay.	CL, CH	A-7	0	95-100	85-100	75-100	60-95	40-70	16-42
BcA*:											
Beadle	0-6	Loam	CL, ML	A-6, A-7	0-5	95-100	95-100	85-100	65-95	30-50	10-20
	6-30	Clay loam, clay	CL, CH	A-7	0-5	90-100	85-100	75-100	55-95	40-60	15-35
	30-60	Clay loam, clay	CL, CH, ML, MH	A-6, A-7	0-5	90-100	85-100	75-95	55-85	35-55	15-25
Jerauld	0-3	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	60-100	25-40	5-15
	3-8	Silty clay, clay, clay loam.	CH, CL	A-7	0	95-100	95-100	90-100	55-100	45-70	20-40
	8-18	Silty clay, clay, clay loam.	CH, CL	A-7	0	95-100	95-100	90-100	55-95	45-70	20-40
	18-60	Silty clay, clay, clay loam.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	55-90	40-85	20-45
BdF	0-3	Loam	CL, CL-ML	A-4, A-6	0-5	90-100	80-100	75-100	60-75	20-38	5-15
Betts	3-25	Loam, clay loam	CL	A-6, A-7	0-5	90-100	85-100	75-100	50-85	30-45	10-25
	25-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	85-100	75-100	50-85	30-45	10-25
BeE*:											
Betts	0-3	Loam	CL, CL-ML	A-4, A-6	0-5	90-100	80-100	75-100	60-75	20-38	5-15
	3-25	Loam, clay loam	CL	A-6, A-7	0-5	90-100	85-100	75-100	50-85	30-45	10-25
	25-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	85-100	75-100	50-85	30-45	10-25
Ethan	0-6	Loam	CL	A-4, A-6	0	95-100	90-100	80-95	55-80	30-40	8-15
	6-21	Loam, clay loam	CL, ML	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	21-60	Loam, clay loam	CL, CH	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-55	8-27
Bn	0-22	Silt loam	CL-ML, CL	A-4, A-6	0	100	95-100	80-95	60-85	25-40	5-15
Bon	22-60	Stratified silty clay loam to fine sandy loam.	ML, SM, SC, CL	A-4, A-6, A-7	0	95-100	95-100	75-100	45-95	25-45	3-22
Bo	0-22	Silt loam	CL-ML, CL	A-4, A-6	0	100	90-100	80-95	60-85	25-40	5-15
Bon	22-60	Stratified silty clay loam to fine sandy loam.	ML, SM, CL, CL-ML	A-4, A-6, A-7	0	95-100	95-100	75-100	45-95	25-45	3-22
BsD*:											
Boyd	0-5	Silty clay	CH, MH	A-7	0	100	95-100	95-100	90-100	65-90	30-55
	5-23	Silty clay, clay	CH, MH	A-7	0	100	95-100	95-100	80-100	65-90	30-55
	23-31	Silty clay, clay, shaly clay.	CH, MH	A-7	0	95-100	80-100	75-100	60-100	65-90	30-55
	31-60	Weathered bedrock	CH, MH	A-7	0	95-100	80-100	75-100	75-100	50-90	25-50
Sansarc	0-4	Clay	CH, MH	A-7	0	100	95-100	90-100	75-100	60-90	25-55
	4-13	Shaly clay, very shaly clay, clay.	CH, MH	A-7	0	80-100	75-100	75-100	75-100	60-90	25-55
	13-60	Weathered bedrock	CH, MH	A-7	0	100	100	90-100	80-100	60-90	25-55
CeB*, CeC*:											
Clarno	0-7	Loam	CL, CL-ML	A-4, A-6	0	100	95-100	85-100	55-90	25-40	5-15
	7-24	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
	24-60	Loam, clay loam	CL	A-6, A-7	0-5	90-100	90-100	80-100	50-80	30-45	10-20
Ethan	0-6	Loam	CL	A-4, A-6	0	95-100	90-100	80-95	55-80	30-40	8-15
	6-21	Loam, clay loam	CL, ML	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	21-60	Loam, clay loam	CL, CH	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-55	8-27

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Da*:											
DeGrey----------	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	25-40	5-15
	8-17	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	90-100	80-100	40-65	15-35
	17-31	Silty clay, silty clay loam.	CL, CH	A-7	0	100	95-100	90-100	80-100	40-65	15-35
	31-60	Loam, clay loam	CL, CH, MH, ML	A-6, A-7	0	100	95-100	90-100	80-100	30-65	12-32
Jerauld---------	0-3	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	60-100	25-40	5-15
	3-8	Silty clay, clay, clay loam.	CH, CL	A-7	0	95-100	95-100	90-100	55-100	45-70	20-40
	8-18	Silty clay, clay, clay loam.	CH, CL	A-7	0	95-100	95-100	90-100	55-95	45-70	20-40
	18-60	Silty clay, clay, clay loam.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	55-90	40-85	20-45
Db*:											
DeGrey----------	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	25-40	5-15
	8-17	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	90-100	80-100	40-65	15-35
	17-31	Silty clay, silty clay loam.	CL, CH	A-7	0	100	95-100	90-100	80-100	40-65	15-35
	31-60	Loam, clay loam	CL, CH, MH, ML	A-6, A-7	0	100	95-100	90-100	80-100	30-65	12-32
Walke----------	0-8	Silt loam--------	CL, CL-ML, ML	A-6, A-4	0	100	100	95-100	80-100	25-40	3-15
	8-36	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	95-100	85-100	40-55	15-28
	36-60	Clay loam, clay	CL, CH, MH	A-7	0	95-100	95-100	90-100	70-90	40-65	15-30
DmC*:											
Delmont---------	0-5	Loam-------------	CL	A-6, A-4	0	90-100	90-100	80-95	60-75	28-40	8-20
	5-17	Loam, fine sandy loam, sandy loam.	SC, CL, CL-ML, SM-SC	A-4, A-6	0	80-100	70-100	50-100	35-70	20-40	5-18
	17-60	Gravelly sand, gravelly loamy sand.	SM, SW-SM, SM-SC, SW	A-1, A-2	0-5	60-100	40-70	15-50	3-30	<25	NP-5
Talmo----------	0-7	Gravelly loam----	ML, CL, SM, SC	A-4, A-6	0-5	90-100	60-80	50-75	35-60	25-40	3-15
	7-60	Gravelly sand, very gravelly sand, gravelly loamy sand.	GW, GM, SW, SM	A-2, A-1	0-10	40-95	30-65	15-35	0-35	<25	NP-5
DnA----------	0-15	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
Dorna	15-21	Silt loam, very fine sandy loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	21-60	Silty clay, clay, silty clay loam.	CH, MH, CL, ML	A-7	0	100	100	90-100	80-100	40-75	15-40
Du----------	0-1	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	100	85-100	60-90	20-35	3-15
Durrstein	1-16	Silty clay, clay, clay loam.	CH, MH	A-7	0	95-100	95-100	85-100	65-95	50-85	20-50
	16-60	Silty clay, clay, clay loam.	CH, CL	A-7	0	95-100	95-100	85-100	60-95	40-75	15-50
EaA----------	0-7	Silt loam--------	ML, CL	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	5-20
Eakin	7-29	Silty clay loam, silt loam.	CL, ML	A-6, A-7	0	100	95-100	95-100	80-100	35-50	10-25
	29-60	Clay loam, loam, clay.	CL, CH	A-7	0	95-100	85-100	75-100	60-95	40-70	16-42

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
EbB*:											
Eakin	0-7	Silt loam	ML, CL	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	5-20
	7-29	Silty clay loam, silt loam.	CL, ML	A-6, A-7	0	100	95-100	95-100	80-100	35-50	10-25
	29-60	Clay loam, loam, clay.	CL, CH	A-7	0	95-100	85-100	75-100	60-95	40-70	16-42
Beadle	0-6	Loam	CL, ML	A-6, A-7	0-5	95-100	95-100	85-100	65-95	30-50	10-20
	6-30	Clay loam, clay	CL, CH	A-7	0-5	90-100	85-100	75-95	55-95	40-60	15-35
	30-60	Clay loam, clay	CL, CH, ML, MH	A-6, A-7	0-5	90-100	85-100	75-95	55-85	35-55	15-25
EdA*:											
Eakin	0-7	Silt loam	ML, CL	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	5-20
	7-29	Silty clay loam, silt loam.	CL, ML	A-6, A-7	0	100	95-100	95-100	80-100	35-50	10-25
	29-60	Clay loam, loam, clay.	CL, CH	A-7	0	95-100	85-100	75-100	60-95	40-70	16-42
DeGrey	0-8	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	25-40	5-15
	8-17	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	90-100	80-100	40-65	15-35
	17-31	Silty clay, silty clay loam.	CL, CH	A-7	0	100	95-100	90-100	80-100	40-65	15-35
	31-60	Loam, clay loam	CL, CH, MH, ML	A-6, A-7	0	100	95-100	90-100	80-100	30-65	12-32
EeB*, EeC*:											
Eakin	0-7	Silt loam	ML, CL	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	5-20
	7-29	Silty clay loam, silt loam.	CL, ML	A-6, A-7	0	100	95-100	95-100	80-100	35-50	10-25
	29-60	Clay loam, loam, clay.	CL, CH	A-7	0	95-100	85-100	75-100	60-95	40-70	16-42
Ethan	0-6	Loam	CL	A-4, A-6	0	95-100	90-100	80-95	55-80	30-40	8-15
	6-21	Loam, clay loam	CL, ML	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	21-60	Loam, clay loam	CL, CH	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-55	8-27
EmA	0-7	Loam	ML, CL	A-4, A-6	0	90-100	85-100	70-95	55-80	30-40	5-15
Enet	7-26	Loam, clay loam, sandy clay loam.	CL, ML, SC, SM	A-4, A-6	0	90-100	85-100	70-95	45-75	30-40	5-15
	26-30	Loam, fine sandy loam, sandy loam.	ML, CL, SM, SC	A-4, A-6	0	90-100	85-95	60-95	40-75	20-40	3-15
	30-60	Gravelly loamy sand, gravelly sand.	SW, SW-SM, SM, SM-SC	A-1, A-2, A-3	0	60-95	45-85	10-60	0-15	<25	NP-5
EnC*:											
Enet	0-7	Loam	ML, CL	A-4, A-6	0	90-100	85-100	70-95	55-80	30-40	5-15
	7-26	Loam, clay loam, sandy clay loam.	CL, ML, SC, SM	A-4, A-6	0	90-100	85-100	70-95	45-75	30-40	5-15
	26-30	Loam, fine sandy loam, sandy loam.	ML, CL, SM, SC	A-4, A-6	0	90-100	85-95	60-95	40-75	20-40	3-15
	30-60	Gravelly loamy sand, gravelly sand.	SW, SW-SM, SM, SM-SC	A-1, A-2, A-3	0	60-95	45-85	10-60	0-15	<25	NP-5
Delmont	0-5	Loam	CL	A-6, A-4	0	90-100	90-100	80-95	60-75	28-40	8-20
	5-17	Loam, fine sandy loam, sandy loam.	SC, CL, CL-ML, SM-SC	A-4, A-6	0	80-100	70-100	50-100	35-70	20-40	5-18
	17-60	Gravelly sand, gravelly loamy sand.	SM, SW-SM, SM-SC, SW	A-1, A-2	0-5	60-100	40-70	15-50	3-30	<25	NP-5

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
EtD*:											
Ethan	0-6	Loam	CL	A-4, A-6	0	95-100	90-100	80-95	55-80	30-40	8-15
	6-21	Loam, clay loam	CL, ML	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	21-60	Loam, clay loam	CL, CH	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-55	8-27
Clarno	0-7	Loam	CL, CL-ML	A-4, A-6	0	100	95-100	85-100	55-90	25-40	5-15
	7-24	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
	24-60	Loam, clay loam	CL	A-6, A-7	0-5	90-100	90-100	80-100	50-80	30-45	10-20
EuC*:											
Ethan	0-6	Loam	CL	A-4, A-6	0	95-100	90-100	80-95	55-80	30-40	8-15
	6-21	Loam, clay loam	CL, ML	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	21-60	Loam, clay loam	CL, CH	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-55	8-27
Homme	0-8	Silty clay loam	CL	A-6, A-7	0	100	95-100	95-100	85-95	35-45	15-25
	8-27	Silty clay loam	CL, CH	A-7	0	100	95-100	95-100	85-95	40-55	15-30
	27-38	Silty clay loam, silt loam.	CL, CH	A-6, A-7	0-5	95-100	95-100	90-100	80-90	35-55	15-30
	38-60	Clay loam, loam	CL	A-6	0-5	95-100	90-100	85-100	60-80	30-40	10-20
GsE*:											
Gavins	0-5	Silt loam	ML, MH	A-7	0	100	100	90-100	85-100	40-55	15-25
	5-17	Silt loam, loam, silty clay loam.	ML, MH	A-7, A-6	0	100	95-100	90-100	85-100	40-60	10-28
	17-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Sansarc	0-4	Clay	CH, MH	A-7	0	100	95-100	90-100	75-100	60-90	25-55
	4-13	Shaly clay, very shaly clay, clay.	CH, MH	A-7	0	80-100	75-100	75-100	75-100	60-90	25-55
	13-60	Weathered bedrock	CH, MH	A-7	0	100	100	90-100	80-100	60-90	25-55
Gv	0-19	Silt loam	ML, CL	A-4, A-6	0	100	100	90-100	70-90	30-40	5-15
Graceville	19-54	Silty clay loam, silt loam.	CL	A-4, A-6, A-7	0	100	100	90-100	70-90	30-45	8-20
	54-60	Gravelly sand, gravelly loamy sand.	SM, GW-GM, SW-SM, GM	A-1, A-2	0	40-80	30-70	20-50	5-30	<25	NP-4
HaA	0-14	Loam	CL, CL-ML	A-4, A-6	0	95-100	85-100	75-100	50-85	25-40	5-20
Hand	14-25	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6, A-7	0-5	95-100	80-100	75-100	50-90	25-45	5-20
	25-60	Stratified silt loam to fine sandy loam.	CL, CL-ML, SC	A-4, A-6	0-5	95-100	80-100	70-100	45-80	25-40	5-15
Hb	0-9	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	85-100	70-100	25-40	5-15
Haynie	9-60	Silt loam, very fine sandy loam.	CL-ML, CL	A-4, A-6	0	100	100	85-100	85-100	25-35	5-15
Hc	0-7	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	85-100	80-100	25-40	5-15
Haynie Variant	7-60	Silt loam, very fine sandy loam.	CL-ML, CL	A-4, A-6	0	100	100	85-100	70-100	25-40	5-15
HeB	0-9	Loam	CL, CL-ML	A-4, A-6	0-5	95-100	90-100	85-100	60-70	25-35	5-15
Henkin	9-48	Loam, sandy loam, fine sandy loam.	SM, SC, ML, CL	A-2, A-4	0-5	90-100	80-100	65-100	20-55	15-30	NP-10
	48-60	Stratified fine sand to clay loam.	SM, SC	A-2, A-4, A-1, A-3	0-5	90-100	80-100	35-95	5-50	15-35	NP-10
HgA	0-7	Silt loam	ML, CL	A-4, A-6, A-7	0	100	95-100	95-100	90-100	30-45	5-20
Highmore	7-18	Silty clay loam	CL, CH	A-6, A-7	0	100	95-100	90-100	85-100	35-55	15-25
	18-48	Silty clay loam, silt loam.	ML, CL	A-6, A-7	0	100	95-100	90-100	85-100	30-45	10-22
	48-60	Clay loam, loam	CL, CH	A-7	0-5	95-100	85-100	75-100	60-95	40-70	16-42

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
HhB*:											
Highmore	0-7	Silt loam	ML, CL	A-4, A-6, A-7	0	100	95-100	95-100	90-100	30-45	5-20
	7-18	Silty clay loam	CL, CH	A-6, A-7	5	100	95-100	90-100	85-100	35-55	15-25
	18-48	Silty clay loam, silt loam.	ML, CL	A-6, A-7	0	100	95-100	90-100	85-100	30-45	10-22
	48-60	Clay loam, loam	CL, CH	A-7	0-5	95-100	85-100	75-100	60-95	40-70	16-42
Eakin	0-7	Silt loam	ML, CL	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	5-20
	7-29	Silty clay loam, silt loam.	CL, ML	A-6, A-7	0	100	95-100	95-100	80-100	35-50	10-25
	29-60	Clay loam, loam, clay.	CL, CH	A-7	0	95-100	85-100	75-100	60-95	40-70	16-42
HlA*:											
Highmore	0-7	Silt loam	ML, CL	A-4, A-6, A-7	0	100	95-100	95-100	90-100	30-45	5-20
	7-18	Silty clay loam	CL, CH	A-6, A-7	0	100	95-100	90-100	85-100	35-55	15-25
	18-48	Silty clay loam, silt loam.	ML, CL	A-6, A-7	0	100	95-100	90-100	85-100	30-45	10-22
	48-60	Clay loam, loam	CL, CH	A-7	0-5	95-100	85-100	75-100	60-95	40-70	16-42
Walke	0-8	Silt loam	CL, CL-ML, ML	A-6, A-4	0	100	100	95-100	80-100	25-40	3-15
	8-36	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	95-100	85-100	40-55	15-28
	36-60	Clay loam, clay	CL, CH, MH	A-7	0	95-100	95-100	90-100	70-90	40-65	15-30
HmB*:											
Homme	0-8	Silty clay loam	CL	A-6, A-7	0	100	95-100	95-100	85-95	35-45	15-25
	8-27	Silty clay loam	CL, CH	A-7	0	100	95-100	95-100	85-95	40-55	15-30
	27-38	Silty clay loam, silt loam.	CL, CH	A-6, A-7	0-5	95-100	95-100	90-100	80-90	35-55	15-30
	38-60	Clay loam, loam	CL	A-6	0-5	95-100	90-100	85-100	60-80	30-40	10-20
Ethan	0-6	Loam	CL	A-4, A-6	0	95-100	90-100	80-95	55-80	30-40	8-15
	6-21	Loam, clay loam	CL, ML	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	21-60	Loam, clay loam	CL, CH	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-55	8-27
Onita	0-10	Silty clay loam	CL	A-6, A-7	0	100	95-100	90-100	65-95	30-45	12-20
	10-30	Silty clay loam, clay loam, silty clay.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	75-100	35-60	10-35
	30-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-6, A-7	0-5	95-100	95-100	85-100	65-100	30-55	10-30
HoA*, HoB*:											
Homme	0-8	Silty clay loam	CL	A-6, A-7	0	100	95-100	95-100	85-95	35-45	15-25
	8-27	Silty clay loam	CL, CH	A-7	0	100	95-100	95-100	85-95	40-55	15-30
	27-38	Silty clay loam, silt loam.	CL, CH	A-6, A-7	0-5	95-100	95-100	90-100	80-90	35-55	15-30
	38-60	Clay loam, loam	CL	A-6	0-5	95-100	90-100	85-100	60-80	30-40	10-20
Onita	0-10	Silty clay loam	CL	A-6, A-7	0	100	95-100	90-100	65-95	30-45	12-20
	10-30	Silty clay loam, clay loam, silty clay.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	75-100	35-60	10-35
	30-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-6, A-7	0-5	95-100	95-100	85-100	65-100	30-55	10-30
HuA, HuB Houdek	0-6	Loam	CL	A-4, A-6, A-7	0	95-100	95-100	85-100	60-85	30-45	8-20
	6-15	Clay loam	CL	A-6, A-7	0	95-100	95-100	85-100	60-80	30-50	10-25
	15-24	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	85-100	60-80	30-50	10-25
	24-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	90-100	80-100	55-80	30-50	10-25

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Hv---------- Hoven	0-3	Silt loam---------	ML, CL, CL-ML	A-4, A-6, A-7	0	100	100	90-100	75-95	27-45	5-20
	3-6	Silty clay, clay, clay loam.	CH, MH, CL	A-7	0	100	95-100	95-100	80-100	45-80	20-40
	6-29	Silty clay, clay, clay loam.	CH, MH, CL	A-7	0	100	95-100	95-100	80-100	45-80	20-40
	29-60	Silty clay, clay, clay loam.	CL, CH	A-6, A-7	0	95-100	90-100	80-100	60-100	35-75	11-45
InB---------- Inavale	0-2	Fine sand---------	SM, SP-SM, SM-SC	A-2, A-3	0	100	90-100	65-85	5-30	<25	NP-5
	2-60	Fine sand, loamy fine sand, loamy sand.	SP-SM, SM, SM-SC	A-2, A-3	0	100	100	70-100	5-30	<25	NP-5
IvA---------- Inavale	0-10	Loamy fine sand	SM, SP-SM, SM-SC	A-2, A-3	0	100	100	85-100	5-35	<25	NP-5
	10-32	Fine sand, loamy fine sand, loamy sand.	SP-SM, SM, SM-SC	A-2, A-3	0	100	90-100	65-100	5-30	<25	NP-5
	32-60	Fine sand, loamy fine sand, loamy sand.	SP-SM, SM, SM-SC	A-2, A-3, A-4	0	100	100	70-100	5-50	<25	NP-5
Ix---------- Inavale Variant	0-7	Loamy fine sand	SM, SP-SM, SM-SC	A-2, A-3	0	100	100	85-100	5-35	<25	NP-5
	7-60	Fine sand, loamy fine sand, loamy sand.	SM, SP-SM, SM-SC	A-2, A-3	0	100	100	70-100	5-50	<25	NP-5
LaA, LaB--------- Lane	0-8	Silty clay loam	CL, MH, ML, CH	A-6, A-7	0	100	100	95-100	75-100	35-55	11-25
	8-24	Silty clay, clay, silty clay loam.	CL, CH, MH, ML	A-7	0	100	95-100	90-100	75-100	45-65	15-35
	24-60	Silty clay, silty clay loam, clay loam.	CL, CH	A-7, A-6	0	100	95-100	85-100	65-100	35-65	15-40
LoA, LoB, LoC---- Lowry	0-7	Silt loam---------	CL, CL-ML, ML	A-4, A-6	0	100	100	95-100	80-100	25-40	5-15
	7-15	Silt loam---------	CL, CL-ML, ML	A-4, A-6	0	100	100	95-100	80-100	25-40	5-15
	15-60	Silt loam, loam, very fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	100	100	95-100	70-100	25-40	3-15
LrF*: Lowry----------	0-7	Silt loam---------	CL, CL-ML, ML	A-4, A-6	0	100	100	95-100	80-100	25-40	5-15
	7-15	Silt loam---------	CL, CL-ML, ML	A-4, A-6	0	100	100	95-100	80-100	25-40	5-15
	15-60	Silt loam, loam, very fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	100	100	95-100	70-100	25-40	3-15
Gavins----------	0-5	Silt loam---------	ML, MH	A-7	0	100	100	90-100	85-100	40-55	15-25
	5-17	Silt loam, loam, silty clay loam.	ML, MH	A-7, A-6	0	100	95-100	90-100	85-100	40-60	10-28
	17-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
LsD*: Lowry----------	0-7	Silt loam---------	CL, CL-ML, ML	A-4, A-6	0	100	100	95-100	80-100	25-40	5-15
	7-15	Silt loam---------	CL, CL-ML, ML	A-4, A-6	0	100	100	95-100	80-100	25-40	5-15
	15-60	Silt loam, loam, very fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	100	100	95-100	70-100	25-40	3-15

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
LsD*:											
Sully	0-4	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-40	3-15
	4-60	Silt loam, very fine sandy loam.	ML, CL-ML, CL	A-4, A-6	0	100	100	90-100	85-100	20-40	3-15
MeE	0-4	Loam	ML	A-4	0	95-100	93-100	60-95	50-75	25-35	3-10
Meadin	4-17	Sandy loam, very gravelly loamy sand, gravelly sandy loam.	SM, SM-SC, GM, GP-GM	A-1, A-3, A-2	0	40-95	35-87	17-65	5-35	<25	NP-7
	17-60	Gravelly coarse sand, very gravelly coarse sand.	SW-SM, SP, GP-GM, GP	A-1	0	30-90	18-65	9-35	1-8	<25	NP-7
Mo	0-12	Silt loam	ML, CL	A-6, A-4	0	100	100	90-100	70-100	30-40	5-15
Mobridge	12-23	Silty clay loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	85-100	30-45	10-20
	23-60	Silty clay loam, clay loam, silt loam.	CL	A-6, A-7	0-5	95-100	95-100	95-100	85-100	30-45	10-25
Mu	0-11	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-2-4, A-4	0	100	95-100	65-100	30-55	15-30	NP-7
Munjor	11-60	Fine sandy loam, loamy very fine sand, loam.	SM, SC, ML, CL	A-4	0	100	95-100	85-100	35-65	15-30	3-10
OeF	0-17	Silty clay, shaly clay.	CH, MH	A-7	0	80-100	75-100	75-100	75-100	50-85	20-50
Okaton	17-60	Weathered bedrock	CH, MH	A-7	0	100	95-100	90-100	85-100	50-100	20-65
Oh	0-9	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-2, A-4	0	100	95-100	65-100	30-55	15-30	NP-7
Onawa	9-45	Stratified silty clay and clay.	CH	A-7	0	100	100	95-100	95-100	60-85	40-60
	45-60	Silt loam, very fine sandy loam, loam.	CL, CL-ML	A-4, A-6	0	100	100	95-100	85-100	25-40	5-20
Om	0-6	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-85	40-60
Onawa	6-21	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-85	40-60
	21-60	Silt loam, very fine sandy loam, loam.	CL, CL-ML	A-4, A-6	0	100	100	95-100	85-100	25-40	5-20
On	0-10	Silt loam	CL, ML	A-4, A-6, A-7	0	100	95-100	90-100	70-100	30-45	7-20
Onita	10-30	Silty clay loam, clay loam, silty clay.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	75-100	35-60	10-35
	30-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-6, A-7	0-5	95-100	95-100	85-100	65-100	30-55	10-30
Oo*:											
Onita	0-10	Silty clay loam	CL	A-6, A-7	0	100	95-100	90-100	65-95	30-45	12-20
	10-30	Silty clay loam, clay loam, silty clay.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	75-100	35-60	10-35
	30-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-6, A-7	0-5	95-100	95-100	85-100	65-100	30-55	10-30
Davison	0-7	Loam	CL-ML, CL	A-4, A-6	0	95-100	95-100	85-95	60-75	25-40	5-20
	7-31	Loam, clay loam, sandy loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	0	95-100	95-100	85-100	45-80	25-35	5-15
	31-60	Loam, clay loam	CL-ML, CL	A-4, A-6	0-5	95-100	95-100	85-100	60-80	25-40	5-20

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Os*:											
Onita	0-10	Silt loam	CL, ML	A-4, A-6, A-7	0	100	95-100	90-100	70-100	30-45	7-20
	10-30	Silty clay loam, clay loam, silty clay.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	75-100	35-60	10-35
	30-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-6, A-7	0-5	95-100	95-100	85-100	65-100	30-55	10-30
Hoven	0-3	Silt loam	ML, CL, CL-ML	A-4, A-6, A-7	0	100	100	90-100	75-95	27-45	5-20
	3-6	Silty clay, clay, clay loam.	CH, MH, CL	A-7	0	100	95-100	95-100	80-100	45-80	20-40
	6-29	Silty clay, clay, clay loam.	CH, MH, CL	A-7	0	100	95-100	95-100	80-100	45-80	20-40
	29-60	Silty clay, clay, clay loam.	CL, CH	A-6, A-7	0	95-100	90-100	80-100	60-100	35-75	11-45
Ot*:											
Onita	0-10	Silt loam	CL, ML	A-4, A-6, A-7	0	100	95-100	90-100	70-100	30-45	7-20
	10-30	Silty clay loam, clay loam, silty clay.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	75-100	35-60	10-35
	30-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-6, A-7	0-5	95-100	95-100	85-100	65-100	30-55	10-30
Tetonka	0-11	Silt loam	ML, CL	A-4, A-6, A-7	0	100	100	95-100	80-100	27-50	5-20
	11-13	Silty clay loam, silt loam.	CL	A-6, A-7	0	95-100	95-100	90-100	80-100	30-50	10-25
	13-44	Clay, silty clay, clay loam.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	65-100	40-70	15-35
	44-60	Clay loam, silty clay, clay.	CL, CH	A-6, A-7	0	95-100	95-100	80-100	55-95	30-60	11-30
Pg*. Pits											
PoA, PoB	0-6	Silty clay	CH, MH	A-7	0	100	100	90-100	80-100	55-70	25-40
Promise	6-26	Clay	CH, MH	A-7	0	100	100	90-100	85-100	60-85	25-50
	26-60	Clay, silty clay	CH, MH	A-7	0	100	100	90-100	85-100	60-90	25-55
Pr	0-11	Loam	CL	A-4, A-6	0	95-100	95-100	85-100	60-90	25-40	8-20
Prosper	11-25	Clay loam, silty clay loam.	CL, ML	A-6, A-7	0	95-100	95-100	85-100	60-90	35-50	10-25
	25-32	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
	32-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
Sa	0-22	Silty clay loam	CL, CL-CH	A-6, A-7	0	100	100	95-100	85-95	30-50	10-25
Salmo	22-37	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	85-95	30-45	10-20
	37-60	Silty clay loam, silty clay, clay loam.	CL, CH	A-7	0	100	95-100	90-100	75-95	40-60	15-35
Sm*:											
Salmo	0-22	Silty clay loam	CL, CL-CH	A-6, A-7	0	100	100	95-100	85-95	30-50	10-25
	22-37	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	85-95	30-45	10-20
	37-60	Silty clay loam, silty clay, clay loam.	CL, CH	A-7	0	100	95-100	90-100	75-95	40-60	15-35
Napa	0-1	Silt loam	ML, CL	A-4, A-6	0	100	100	100	90-100	30-40	5-15
	1-33	Silty clay, clay	CH, MH	A-7	0	100	100	95-100	90-100	50-80	20-45
	33-60	Silty clay, clay, silty clay loam.	CL, CH, MH	A-7	0	100	100	95-100	90-100	40-75	15-40

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
SnF----------	0-4	Clay----------	CH, MH	A-7	0	100	95-100	90-100	75-100	60-90	25-55
Sansarc	4-13	Shaly clay, very shaly clay, clay.	CH, MH	A-7	0	80-100	75-100	75-100	75-100	60-90	25-55
	13-60	Weathered bedrock	CH, MH	A-7	0	100	100	90-100	80-100	60-90	25-55
SoF*:											
Sansarc---------	0-4	Clay----------	CH, MH	A-7	0	100	95-100	90-100	75-100	60-90	25-55
	4-13	Shaly clay, very shaly clay, clay.	CH, MH	A-7	0	80-100	75-100	75-100	75-100	60-90	25-55
	13-60	Weathered bedrock	CH, MH	A-7	0	100	100	90-100	80-100	60-90	25-55
Boyd----------	0-5	Silty clay-------	CH, MH	A-7	0	100	95-100	95-100	90-100	65-90	30-55
	5-23	Silty clay, clay	CH, MH	A-7	0	100	95-100	95-100	80-100	65-90	30-55
	23-31	Silty clay, clay, shaly clay.	CH, MH	A-7	0	95-100	80-100	75-100	60-100	65-90	30-55
	31-60	Weathered bedrock	CH, MH	A-7	0	95-100	80-100	75-100	75-100	50-90	25-50
SrF*:											
Sansarc---------	0-4	Clay----------	CH, MH	A-7	0	100	95-100	90-100	75-100	60-90	25-55
	4-13	Shaly clay, very shaly clay, clay.	CH, MH	A-7	0	80-100	75-100	75-100	75-100	60-90	25-55
	13-60	Weathered bedrock	CH, MH	A-7	0	100	100	90-100	80-100	60-90	25-55
Rock outcrop.											
SuE----------	0-4	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-40	3-15
Sully	4-60	Silt loam, very fine sandy loam.	ML, CL-ML, CL	A-4, A-6	0	100	100	90-100	85-100	20-40	3-15
TaC----------	0-7	Gravelly sandy loam.	ML, CL, SM, SC	A-4, A-6	0-5	90-100	60-80	50-75	35-60	25-40	3-15
Talmo	7-60	Gravelly sand, very gravelly sand, gravelly loamy sand.	GW, GM, SW, SM	A-2, A-1	0-10	40-95	30-65	15-35	0-35	<25	NP-5
TbE*:											
Talmo----------	0-7	Gravelly loam----	ML, CL, SM, SC	A-4, A-6	0-5	90-100	60-80	50-75	35-60	25-40	3-15
	7-60	Gravelly sand, very gravelly sand, gravelly loamy sand.	GW, GM, SW, SM	A-2, A-1	0-10	40-95	30-65	15-35	0-35	<25	NP-5
Betts----------	0-3	Loam----------	CL, CL-ML	A-4, A-6	0-5	90-100	80-100	75-100	60-75	20-38	5-15
	3-25	Loam, clay loam	CL	A-6, A-7	0-5	90-100	85-100	75-100	50-85	30-45	10-25
	25-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	85-100	75-100	50-85	30-45	10-25
Te----------	0-11	Silt loam--------	ML, CL	A-4, A-6, A-7	0	100	100	95-100	80-100	27-50	5-20
Tetonka	11-13	Silty clay, silt loam.	CL	A-6, A-7	0	95-100	95-100	90-100	80-100	30-50	10-25
	13-44	Clay, silty clay, clay loam.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	65-100	40-70	15-35
	44-60	Clay loam, silty clay, clay.	CL, CH	A-6, A-7	0	95-100	95-100	80-100	55-95	30-60	11-30
Tn*:											
Tetonka---------	0-11	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-100	30-50	10-25
	11-13	Silty clay loam, silt loam.	CL	A-6, A-7	0	95-100	95-100	90-100	80-100	30-50	10-25
	13-44	Clay, silty clay, clay loam.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	65-100	40-70	15-35
	44-60	Clay loam, silty clay, clay.	CL, CH	A-6, A-7	0	95-100	95-100	80-100	55-95	30-60	11-30

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Tn*:											
Chancellor------	0-15	Silty clay loam	CL, CH, MH, ML	A-6, A-7	0	100	100	95-100	85-100	35-55	15-25
	15-32	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	85-100	40-60	15-30
	32-60	Silty clay, silty clay loam, loam.	CL, CH, ML, MH	A-6, A-7	0	100	100	85-100	70-100	35-60	15-30
Wd---------------	0-7	Silty clay-------	CH, MH	A-7	0	100	100	90-100	85-100	50-80	20-45
Wendte Variant	7-60	Stratified silty clay loam to clay.	CL, CH	A-7	0	100	100	90-100	70-100	45-80	20-45
Wo---------------	0-9	Silty clay loam	CL	A-7	0	100	100	95-100	85-95	42-50	17-22
Worthing	9-39	Silty clay, clay	CH, MH	A-7	0	100	100	95-100	85-100	50-70	22-35
	39-60	Silty clay, silty clay loam, clay loam.	CL, CH, ML, MH	A-7	0	100	95-100	90-100	70-100	40-65	15-30
Wp---------------	0-9	Silty clay loam	CL	A-7	0	100	100	95-100	85-95	40-50	15-25
Worthing	9-39	Silty clay, clay	CH	A-7	0	100	100	95-100	80-100	50-70	25-40
	39-60	Silty clay, silty clay loam, clay loam.	CL, CH, ML, MH	A-7	0	100	95-100	90-100	70-100	40-65	15-30

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
							K	T		
	In	In/hr	In/in	pH	Mmhos/cm					Pct
AaA, AaB, AaC----	0-6	0.6-2.0	0.19-0.22	6.1-7.3	<2	Moderate----	0.32	5	6	2-4
Agar	6-18	0.6-2.0	0.17-0.22	6.6-7.8	<2	Moderate----	0.43			
	18-38	0.6-2.0	0.17-0.20	7.4-8.4	<2	Low---------	0.43			
	38-60	0.6-2.0	0.17-0.20	7.4-9.0	<2	Low---------	0.43			
Ab----------	0-9	<0.2	0.11-0.13	7.4-8.4	<2	High--------	0.28	5	4	2-3
Albaton	9-60	<0.2	0.11-0.13	7.4-8.4	<2	High--------	0.28			
An----------	0-7	0.06-0.2	0.11-0.14	7.9-8.4	<2	High--------	0.32	5	8	2-4
Albaton	7-60	0.06-0.2	0.11-0.14	7.9-8.4	<2	High--------	0.32			
Ao----------	0-8	0.6-2.0	0.21-0.23	7.4-8.4	<2	Moderate----	0.32	5	7	2-4
Aowa	8-60	0.6-2.0	0.17-0.22	7.4-8.4	<2	Low---------	0.43			
Ar----------	0-7	0.6-2.0	0.18-0.22	6.6-8.4	<2	Moderate----	0.28	4	4L	2-4
Arlo	7-20	0.6-2.0	0.15-0.19	7.4-8.4	<2	Moderate----	0.28			
	20-49	0.6-2.0	0.13-0.17	7.4-8.4	<4	Low---------	0.28			
	49-60	6.0-20	0.03-0.06	7.4-8.4	<4	Low---------	0.10			
AsA*:										
Arlo----------	0-9	0.6-2.0	0.18-0.22	6.6-8.4	<2	Moderate----	0.28	4	4L	2-4
	9-16	0.6-2.0	0.15-0.19	7.4-8.4	<2	Moderate----	0.28			
	16-39	0.6-2.0	0.13-0.17	7.4-8.4	<4	Low---------	0.28			
	39-60	6.0-20	0.03-0.06	7.4-8.4	<4	Low---------	0.10			
Enet----------	0-7	0.6-2.0	0.18-0.20	5.6-7.3	<2	Low---------	0.28	4	6	2-4
	7-26	0.6-2.0	0.18-0.22	6.6-7.8	<2	Low---------	0.28			
	26-30	0.6-6.0	0.11-0.20	6.6-8.4	<2	Low---------	0.28			
	30-60	6.0-20	0.03-0.06	7.4-8.4	<2	Low---------	0.10			
BbC*:										
Beadle----------	0-6	0.6-2.0	0.18-0.22	6.1-7.3	<2	Low---------	0.28	5	6	2-4
	6-30	0.06-0.6	0.13-0.19	6.6-8.4	<2	High--------	0.28			
	30-60	0.2-0.6	0.13-0.17	7.4-8.4	2-4	Moderate----	0.37			
Eakin----------	0-7	0.6-2.0	0.19-0.22	6.1-7.3	<2	Moderate----	0.32	5	6	2-4
	7-29	0.6-2.0	0.18-0.21	6.6-8.4	<2	Moderate----	0.43			
	29-60	0.2-0.6	0.16-0.20	7.4-9.0	<4	Moderate----	0.43			
BoA*:										
Beadle----------	0-6	0.6-2.0	0.18-0.22	6.1-7.3	<2	Low---------	0.28	5	6	2-4
	6-30	0.06-0.6	0.13-0.19	6.6-8.4	<2	High--------	0.28			
	30-60	0.2-0.6	0.13-0.17	7.4-8.4	2-4	Moderate----	0.37			
Jerauld---------	0-3	0.6-2.0	0.18-0.22	5.6-7.3	<4	Moderate----	0.43	1	6	1-3
	3-8	<0.2	0.10-0.15	6.6-8.4	2-8	High--------	0.32			
	8-18	<0.2	0.10-0.15	7.9-9.0	4-16	High--------	0.32			
	18-60	<0.2	0.08-0.13	7.4-9.0	4-16	High--------	0.32			
BdF----------	0-3	0.6-2.0	0.16-0.18	6.6-8.4	<2	Moderate----	0.28	5	4L	1-3
Betts	3-25	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate----	0.37			
	25-60	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate----	0.37			
BeE*:										
Betts----------	0-3	0.6-2.0	0.16-0.18	6.6-8.4	<2	Moderate----	0.28	5	4L	1-3
	3-25	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate----	0.37			
	25-60	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate----	0.37			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
							K	T		
	In	In/hr	In/in	pH	Mmhos/cm					Pct
BeE*:										
Ethan	0-6	0.6-2.0	0.18-0.20	6.1-7.8	<2	Moderate	0.28	5	6	1-3
	6-21	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.37			
	21-60	0.2-2.0	0.16-0.20	7.4-9.0	2-8	Moderate	0.37			
Bn, Bo	0-22	0.6-2.0	0.19-0.22	6.6-8.4	<2	Low	0.24	5	6	4-6
Bon	22-60	0.6-6.0	0.11-0.16	7.4-8.4	<2	Low	0.32			
BsD*:										
Boyd	0-5	<0.2	0.10-0.14	6.6-8.4	<2	Very high	0.37	4	4	2-4
	5-23	<0.2	0.08-0.12	6.6-8.4	<2	Very high	0.37			
	23-31	<0.2	0.08-0.12	6.6-8.4	<2	Very high	0.37			
	31-60	---	---	---	<2	Very high	----			
Sansarc	0-4	0.06-0.2	0.08-0.12	6.6-8.4	<2	Very high	0.37	2	4	1-2
	4-13	0.06-0.2	0.08-0.12	7.4-8.4	<2	Very high	0.37			
	13-60	---	---	5.6-8.4	---	---	----			
CeB*, CeC*:										
Clarno	0-7	0.6-2.0	0.18-0.20	6.1-7.3	<2	Low	0.28	5	6	2-4
	7-24	0.6-2.0	0.16-0.20	6.6-8.4	<2	Moderate	0.37			
	24-60	0.2-0.6	0.16-0.20	7.4-9.0	2-8	Moderate	0.37			
Ethan	0-6	0.6-2.0	0.18-0.20	6.1-7.8	<2	Moderate	0.28	5	6	1-3
	6-21	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.37			
	21-60	0.2-2.0	0.16-0.20	7.4-9.0	2-8	Moderate	0.37			
Da*:										
DeGrey	0-8	0.6-2.0	0.19-0.22	6.1-7.3	<2	Low	0.37	3	6	2-4
	8-17	<0.2	0.14-0.19	6.6-8.4	2-8	High	0.37			
	17-31	0.06-0.6	0.11-0.17	7.4-8.4	2-8	High	0.37			
	31-60	0.2-0.6	0.14-0.18	7.9-9.0	4-16	Moderate	0.37			
Jerauld	0-3	0.6-2.0	0.18-0.22	5.6-7.3	<4	Moderate	0.43	1	6	1-3
	3-8	<0.2	0.10-0.15	6.6-8.4	2-8	High	0.32			
	8-18	<0.2	0.10-0.15	7.9-9.0	4-16	High	0.32			
	18-60	<0.2	0.08-0.13	7.4-9.0	4-16	High	0.32			
Db*:										
DeGrey	0-8	0.6-2.0	0.19-0.22	6.1-7.3	<2	Low	0.37	3	6	2-4
	8-17	<0.2	0.14-0.19	6.6-8.4	2-8	High	0.37			
	17-31	0.06-0.6	0.11-0.17	7.4-8.4	2-8	High	0.37			
	31-60	0.2-0.6	0.14-0.18	7.9-9.0	4-16	Moderate	0.37			
Walke	0-8	0.6-2.0	0.19-0.22	6.1-7.3	<2	Low	0.32	5	6	2-4
	8-36	0.06-0.6	0.11-0.19	6.6-8.4	<4	High	0.32			
	36-60	0.06-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.32			
DmC*:										
Delmont	0-5	0.6-2.0	0.18-0.20	6.6-7.8	<2	Low	0.28	3	6	2-4
	5-17	0.6-6.0	0.12-0.18	6.6-7.8	<2	Low	0.28			
	17-60	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.10			
Talmo	0-7	0.6-2.0	0.11-0.15	6.6-7.8	<2	Low	0.20	2	6	1-2
	7-60	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.10			
DnA	0-15	0.6-2.0	0.19-0.22	6.6-7.8	<2	Low	0.32	5	5	2-4
Dorna	15-21	0.6-2.0	0.15-0.20	7.4-8.4	<2	Low	0.32			
	21-60	0.06-0.2	0.11-0.17	7.4-8.4	2-4	High	0.32			
Du	0-1	0.6-2.0	0.17-0.20	6.1-7.3	4-16	Low	0.37	1	7	1-3
Durrstein	1-16	<0.2	0.10-0.15	6.6-9.0	4-16	High	0.37			
	16-60	<0.2	0.08-0.13	7.4-9.0	4-16	High	0.37			
EaA	0-7	0.6-2.0	0.19-0.22	6.1-7.3	<2	Moderate	0.32	5	6	2-4
Eakin	7-29	0.6-2.0	0.18-0.21	6.6-8.4	<2	Moderate	0.43			
	29-60	0.2-0.6	0.16-0.20	7.4-9.0	<4	Moderate	0.43			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
							K	T		
	In	In/hr	In/in	pH	Mmhos/cm					Pct
EbB*:										
Eakin	0-7	0.6-2.0	0.19-0.22	6.1-7.3	<2	Moderate	0.32	5	6	2-4
	7-29	0.6-2.0	0.18-0.21	6.6-8.4	<2	Moderate	0.43			
	29-60	0.2-0.6	0.16-0.20	7.4-9.0	<4	Moderate	0.43			
Beadle	0-6	0.6-2.0	0.18-0.22	6.1-7.3	<2	Low	0.28	5	6	2-4
	6-30	0.06-0.6	0.13-0.19	6.6-8.4	<2	High	0.28			
	30-60	0.2-0.6	0.13-0.17	7.4-8.4	2-4	Moderate	0.37			
EdA*:										
Eakin	0-7	0.6-2.0	0.19-0.22	6.1-7.3	<2	Moderate	0.32	5	6	2-4
	7-29	0.6-2.0	0.18-0.21	6.6-8.4	<2	Moderate	0.43			
	29-60	0.2-0.6	0.16-0.20	7.4-9.0	<4	Moderate	0.43			
DeGrey	0-8	0.6-2.0	0.19-0.22	6.1-7.3	<2	Low	0.37	3	6	2-4
	8-17	<0.2	0.14-0.19	6.6-8.4	2-8	High	0.37			
	17-31	0.06-0.6	0.11-0.17	7.4-8.4	2-8	High	0.37			
	31-60	0.2-0.6	0.14-0.18	7.9-9.0	4-16	Moderate	0.37			
EeB*, EeC*:										
Eakin	0-7	0.6-2.0	0.19-0.22	6.1-7.3	<2	Moderate	0.32	5	6	2-4
	7-29	0.6-2.0	0.18-0.21	6.6-8.4	<2	Moderate	0.43			
	29-60	0.2-0.6	0.16-0.20	7.4-9.0	<4	Moderate	0.43			
Ethan	0-6	0.6-2.0	0.18-0.20	6.1-7.8	<2	Moderate	0.28	5	6	1-3
	6-21	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.37			
	21-60	0.2-2.0	0.16-0.20	7.4-9.0	2-8	Moderate	0.37			
EmA	0-7	0.6-2.0	0.18-0.20	5.6-7.3	<2	Low	0.28	4	6	2-4
Enet	7-26	0.6-2.0	0.18-0.22	6.6-7.8	<2	Low	0.28			
	26-30	0.6-6.0	0.11-0.20	6.6-8.4	<2	Low	0.28			
	30-60	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.10			
EnC*:										
Enet	0-7	0.6-2.0	0.18-0.20	5.6-7.3	<2	Low	0.28	4	6	2-4
	7-26	0.6-2.0	0.18-0.22	6.6-7.8	<2	Low	0.28			
	26-30	0.6-6.0	0.11-0.20	6.6-8.4	<2	Low	0.28			
	30-60	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.10			
Delmont	0-5	0.6-2.0	0.18-0.20	6.6-7.8	<2	Low	0.28	3	6	2-4
	5-17	0.6-6.0	0.12-0.18	6.6-7.8	<2	Low	0.28			
	17-60	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.10			
EtD*:										
Ethan	0-6	0.6-2.0	0.18-0.20	6.1-7.8	<2	Moderate	0.28	5	6	1-3
	6-21	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.37			
	21-60	0.2-2.0	0.16-0.20	7.4-9.0	2-8	Moderate	0.37			
Clarno	0-7	0.6-2.0	0.18-0.20	6.1-7.3	<2	Low	0.28	5	6	2-4
	7-24	0.6-2.0	0.16-0.20	6.6-8.4	<2	Moderate	0.37			
	24-60	0.2-0.6	0.16-0.20	7.4-9.0	2-8	Moderate	0.37			
EuC*:										
Ethan	0-6	0.6-2.0	0.18-0.20	6.1-7.8	<2	Moderate	0.28	5	6	1-3
	6-21	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.37			
	21-60	0.2-2.0	0.16-0.20	7.4-9.0	2-8	Moderate	0.37			
Homme	0-8	0.6-2.0	0.19-0.22	6.1-7.3	<2	Moderate	0.32	5	7	2-4
	8-27	0.2-0.6	0.11-0.18	6.1-7.8	<2	High	0.32			
	27-38	0.2-0.6	0.17-0.20	7.4-8.4	<2	Moderate	0.32			
	38-60	0.2-0.6	0.16-0.20	7.4-8.4	2-8	Moderate	0.32			
GsE*:										
Gavins	0-5	0.6-2.0	0.15-0.19	6.6-8.4	<2	Low	0.43	2	4L	1-3
	5-17	0.6-2.0	0.15-0.19	6.6-8.4	<2	Low	0.43			
	17-60	---	---	---	---	---	---			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
							K	T		
	In	In/hr	In/in	pH	Mmhos/cm					Pct
GsE*:										
Sansarc	0-4	0.06-0.2	0.08-0.12	6.6-8.4	<2	Very high	0.37	2	4	1-2
	4-13	0.06-0.2	0.08-0.12	7.4-8.4	<2	Very high	0.37			
	13-60	---	---	5.6-8.4	---	---	----			
Gv	0-19	0.6-2.0	0.19-0.22	5.6-7.3	<2	Moderate	0.32	5	6	4-8
Graceville	19-54	0.6-2.0	0.17-0.22	5.6-7.3	<2	Moderate	0.32			
	54-60	6.0-20	0.03-0.06	6.1-7.8	<2	Low	0.10			
HaA	0-14	0.6-2.0	0.18-0.20	5.6-7.8	<2	Moderate	0.28	5	6	2-4
Hand	14-25	0.6-2.0	0.18-0.22	7.4-8.4	<2	Moderate	0.28			
	25-60	0.6-2.0	0.12-0.18	7.4-8.4	2-8	Low	0.28			
Hb	0-9	0.6-2.0	0.18-0.23	7.4-8.4	<2	Low	0.37	5	6	1-3
Haynie	9-60	0.6-2.0	0.18-0.23	7.4-8.4	<2	Low	0.37			
Hc	0-7	0.6-2.0	0.17-0.20	7.4-8.4	<2	Low	0.37	5	4L	<.5
Haynie Variant	7-60	0.6-2.0	0.15-0.20	7.4-8.4	<2	Low	0.37			
HeB	0-9	2.0-6.0	0.18-0.20	5.6-7.3	<2	Low	0.20	5	5	2-4
Henkin	9-48	2.0-6.0	0.09-0.18	6.1-8.4	<2	Low	0.20			
	48-60	0.6-6.0	0.08-0.16	6.1-8.4	<2	Low	0.20			
HgA	0-7	0.6-2.0	0.19-0.22	6.1-7.3	<2	Low	0.32	5	6	2-4
Highmore	7-18	0.6-2.0	0.17-0.22	6.6-7.8	<2	Moderate	0.43			
	18-48	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.43			
	48-60	0.2-0.6	0.16-0.20	7.4-8.4	2-4	Moderate	0.43			
HhB*:										
Highmore	0-7	0.6-2.0	0.19-0.22	6.1-7.3	<2	Low	0.32	5	6	2-4
	7-18	0.6-2.0	0.17-0.22	6.6-7.8	<2	Moderate	0.43			
	18-48	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.43			
	48-60	0.2-0.6	0.16-0.20	7.4-8.4	2-4	Moderate	0.43			
Eakin	0-7	0.6-2.0	0.19-0.22	6.1-7.3	<2	Moderate	0.32	5	6	2-4
	7-29	0.6-2.0	0.18-0.21	6.6-8.4	<2	Moderate	0.43			
	29-60	0.2-0.6	0.16-0.20	7.4-9.0	<4	Moderate	0.43			
HlA*:										
Highmore	0-7	0.6-2.0	0.19-0.22	6.1-7.3	<2	Low	0.32	5	6	2-4
	7-18	0.6-2.0	0.17-0.22	6.6-7.8	<2	Moderate	0.43			
	18-48	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.43			
	48-60	0.2-0.6	0.16-0.20	7.4-8.4	2-4	Moderate	0.43			
Walke	0-8	0.6-2.0	0.19-0.22	6.1-7.3	<2	Low	0.32	5	6	2-4
	8-36	0.06-0.6	0.11-0.19	6.6-8.4	<4	High	0.32			
	36-60	0.06-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.32			
HmB*:										
Homme	0-8	0.6-2.0	0.19-0.22	6.1-7.3	<2	Moderate	0.32	5	7	2-4
	8-27	0.2-0.6	0.11-0.18	6.1-7.8	<2	High	0.32			
	27-38	0.2-0.6	0.17-0.20	7.4-8.4	<2	Moderate	0.32			
	38-60	0.2-0.6	0.16-0.20	7.4-8.4	2-8	Moderate	0.32			
Ethan	0-6	0.6-2.0	0.18-0.20	6.1-7.8	<2	Moderate	0.28	5	6	1-3
	6-21	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.37			
	21-60	0.2-2.0	0.16-0.20	7.4-9.0	2-8	Moderate	0.37			
Onita	0-10	0.6-2.0	0.19-0.22	5.6-7.3	<2	Moderate	0.28	5	7	2-4
	10-30	0.2-0.6	0.11-0.17	6.1-7.3	<2	High	0.43			
	30-60	0.2-0.6	0.17-0.20	7.4-8.4	<2	Moderate	0.43			
HoA*, HoB*:										
Homme	0-8	0.6-2.0	0.19-0.22	6.1-7.3	<2	Moderate	0.32	5	7	2-4
	8-27	0.2-0.6	0.11-0.18	6.1-7.8	<2	High	0.32			
	27-38	0.2-0.6	0.17-0.20	7.4-8.4	<2	Moderate	0.32			
	38-60	0.2-0.6	0.16-0.20	7.4-8.4	2-8	Moderate	0.32			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
							K	T		
	In	In/hr	In/in	pH	Mmhos/cm					Pct
HoA*, HoB*:										
Onita	0-10	0.6-2.0	0.19-0.22	5.6-7.3	<2	Moderate	0.28	5	7	2-4
	10-30	0.2-0.6	0.11-0.17	6.1-7.3	<2	High	0.43			
	30-60	0.2-0.6	0.17-0.20	7.4-8.4	<2	Moderate	0.43			
HuA, HuB	0-6	0.6-2.0	0.18-0.22	6.1-7.3	<2	Moderate	0.28	5	6	2-4
Houdek	6-15	0.6-2.0	0.16-0.22	6.6-7.8	<2	Moderate	0.37			
	15-24	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
	24-60	0.2-0.6	0.17-0.20	7.4-8.4	<8	Moderate	0.37			
Hv	0-3	0.6-2.0	0.19-0.22	5.6-7.3	<2	Moderate	0.37	1	7	2-4
Hoven	3-6	<0.06	0.10-0.19	6.1-7.8	4-16	High	0.37			
	6-29	<0.06	0.10-0.19	7.4-8.4	4-16	High	0.37			
	29-60	<0.2	0.08-0.17	7.4-9.0	4-16	High	0.37			
InB	0-2	6.0-20	0.07-0.09	6.6-7.8	<2	Low	0.17	5	1	<.5
Inavale	2-60	6.0-20	0.05-0.07	6.6-8.4	<2	Low	0.17			
IvA	0-10	6.0-20	0.10-0.12	6.6-7.8	<2	Low	0.17	5	2	<.5
Inavale	10-32	6.0-20	0.09-0.11	6.6-8.4	<2	Low	0.17			
	32-60	6.0-20	0.05-0.07	6.6-8.4	<2	Low	0.17			
Ix	0-7	6.0-20	0.08-0.10	6.6-7.8	<2	Low	0.17	5	2	<.5
Inavale Variant	7-60	6.0-20	0.06-0.10	6.6-7.8	<2	Low	0.17			
LaA, LaB	0-8	0.6-2.0	0.19-0.22	6.1-7.3	<2	Moderate	0.28	5	7	2-4
Lane	8-24	0.06-0.6	0.13-0.19	6.6-7.8	<2	High	0.28			
	24-60	0.06-0.6	0.11-0.20	7.4-8.4	<4	High	0.37			
LoA, LoB, LoC	0-7	0.6-2.0	0.19-0.22	6.6-7.8	<2	Low	0.32	5	5	2-4
Lowry	7-15	0.6-2.0	0.19-0.22	6.6-8.4	<2	Low	0.32			
	15-60	0.6-2.0	0.15-0.20	7.4-8.4	<2	Low	0.43			
LrF*:										
Lowry	0-7	0.6-2.0	0.19-0.22	6.6-7.8	<2	Low	0.32	5	5	2-4
	7-15	0.6-2.0	0.19-0.22	6.6-8.4	<2	Low	0.32			
	15-60	0.6-2.0	0.15-0.20	7.4-8.4	<2	Low	0.43			
Gavins	0-5	0.6-2.0	0.15-0.19	6.6-8.4	<2	Low	0.43	2	4L	2-4
	5-17	0.6-2.0	0.15-0.19	6.6-8.4	<2	Low	0.43			
	17-60	---	---	---	---	---	---			
LsD*:										
Lowry	0-7	0.6-2.0	0.19-0.22	6.6-7.8	<2	Low	0.32	5	5	2-4
	7-15	0.6-2.0	0.19-0.22	6.6-8.4	<2	Low	0.32			
	15-60	0.6-2.0	0.15-0.20	7.4-8.4	<2	Low	0.43			
Sully	0-4	0.6-2.0	0.17-0.22	6.6-7.8	<2	Low	0.43	5	4L	1-2
	4-60	0.6-2.0	0.15-0.20	7.4-8.4	<2	Low	0.43			
MeE	0-4	0.6-2.0	0.20-0.22	5.1-7.3	<2	Low	0.28	3	5	1-2
Meadin	4-17	6.0-20	0.09-0.11	5.1-7.3	<2	Low	0.10			
	17-60	>20	0.02-0.05	6.1-7.3	<2	Low	0.10			
Mo	0-12	0.6-2.0	0.19-0.22	6.1-7.3	<2	Low	0.32	5	6	4-6
Mobridge	12-23	0.6-2.0	0.19-0.22	6.6-7.8	<2	Moderate	0.32			
	23-60	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.43			
Mu	0-11	2.0-6.0	0.14-0.20	7.4-8.4	<2	Low	0.24	5	3	.5-1
Munjor	11-60	2.0-6.0	0.13-0.18	7.4-8.4	<2	Low	0.24			
OeF	0-17	0.06-0.2	0.11-0.16	7.4-8.4	<2	High	0.37	2	4	1-2
Okaton	17-60	<0.06	---	7.4-8.4	<2	High	---			
Oh	0-9	0.6-6.0	0.22-0.24	7.4-8.4	<2	Low	0.20	5	3	1-3
Onawa	9-31	0.2-0.6	0.12-0.14	7.4-8.4	<2	High	0.32			
	31-60	0.6-6.0	0.20-0.22	7.4-8.4	<2	Low	0.43			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
							K	T		
	In	In/hr	In/in	pH	Mmhos/cm					Pct
Om----------	0-6	0.2-0.6	0.12-0.14	7.4-8.4	<2	High--------	0.32	5	4	2-3
Onawa	6-21	0.2-0.6	0.12-0.14	7.4-8.4	<2	High--------	0.32			
	21-60	0.6-6.0	0.20-0.22	7.4-8.4	<2	Low---------	0.43			
On----------	0-10	0.6-2.0	0.19-0.22	5.6-7.3	<2	Moderate----	0.28	5	6	2-4
Onita	10-30	0.2-0.6	0.11-0.17	6.1-7.3	<2	High--------	0.43			
	30-60	0.2-0.6	0.17-0.20	7.4-8.4	<2	Moderate----	0.43			
Oo*:										
Onita----------	0-10	0.6-2.0	0.19-0.22	5.6-7.3	<2	Moderate----	0.28	5	7	2-4
	10-30	0.2-0.6	0.11-0.17	6.1-7.3	<2	High--------	0.43			
	30-60	0.2-0.6	0.17-0.20	7.4-8.4	<2	Moderate----	0.43			
Davison---------	0-7	0.6-2.0	0.18-0.20	6.6-8.4	<2	Moderate----	0.28	5	4L	2-4
	7-31	0.6-2.0	0.13-0.17	7.4-9.0	<2	Moderate----	0.37			
	31-60	0.6-2.0	0.16-0.20	7.4-8.4	2-8	Moderate----	0.37			
Os*:										
Onita----------	0-10	0.6-2.0	0.19-0.22	5.6-7.3	<2	Moderate----	0.28	5	6	2-4
	10-30	0.2-0.6	0.11-0.17	6.1-7.3	<2	High--------	0.43			
	30-60	0.2-0.6	0.17-0.20	7.4-8.4	<2	Moderate----	0.43			
Hoven----------	0-3	0.6-2.0	0.19-0.22	5.6-7.3	<2	Moderate----	0.37	1	7	2-4
	3-6	<0.06	0.10-0.19	6.1-7.8	4-16	High--------	0.37			
	6-29	<0.06	0.10-0.19	7.4-8.4	4-16	High--------	0.37			
	29-60	<0.2	0.08-0.17	7.4-9.0	4-16	High--------	0.37			
Ot*:										
Onita----------	0-10	0.6-2.0	0.19-0.22	5.6-7.3	<2	Moderate----	0.28	5	6	2-4
	10-30	0.2-0.6	0.11-0.17	6.1-7.3	<2	High--------	0.43			
	30-60	0.2-0.6	0.17-0.20	7.4-8.4	<2	Moderate----	0.43			
Tetonka---------	0-11	0.6-2.0	0.19-0.22	5.6-7.3	<2	Moderate----	0.24	3	6	2-4
	11-13	0.2-0.6	0.19-0.22	5.6-7.3	<2	Moderate----	0.32			
	13-44	<0.2	0.13-0.19	6.1-7.8	<2	High--------	0.32			
	44-60	0.06-0.6	0.11-0.17	6.6-8.4	2-8	High--------	0.32			
Pg*										
Pits										
PoA, PoB---------	0-6	<0.2	0.10-0.14	6.1-7.8	<2	Very high	0.37	5	4	2-4
Promise	6-26	<0.2	0.08-0.14	7.4-9.0	<2	Very high	0.37			
	26-60	<0.2	0.10-0.12	7.4-9.0	2-4	Very high	0.37			
Pr----------	0-11	0.6-2.0	0.18-0.22	5.6-7.8	<2	Moderate----	0.28	5	6	4-6
Prosper	11-25	0.6-2.0	0.19-0.22	6.6-7.8	<2	Moderate----	0.28			
	25-32	0.6-2.0	0.17-0.20	7.4-8.4	2-4	Moderate----	0.28			
	32-60	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate----	0.37			
Sa----------	0-22	0.2-0.6	0.19-0.24	6.6-8.4	4-16	Moderate----	0.28	5	7	3-6
Salmo	22-37	0.2-2.0	0.17-0.20	6.6-8.4	4-16	Moderate----	0.28			
	37-60	0.06-0.6	0.11-0.20	6.6-8.4	4-16	Moderate----	0.28			
Sm*:										
Salmo----------	0-22	0.2-0.6	0.19-0.24	6.6-8.4	4-16	Moderate----	0.28	5	7	3-6
	22-37	0.2-2.0	0.17-0.20	6.6-8.4	4-16	Moderate----	0.28			
	37-60	0.06-0.6	0.11-0.20	6.6-8.4	4-16	Moderate----	0.28			
Napa----------	0-1	0.6-2.0	0.16-0.18	6.6-8.4	<2	Low---------	0.28	3	6	2-5
	1-33	<0.06	0.13-0.18	7.4-9.0	4-16	High--------	0.28			
	33-60	<0.06	0.11-0.16	7.4-9.0	2-8	High--------	0.28			
SnF----------	0-4	0.06-0.2	0.08-0.12	6.6-8.4	<2	Very high	0.37	2	4	1-2
Sansarc	4-13	0.06-0.2	0.08-0.12	7.4-8.4	<2	Very high	0.37			
	13-60	---	---	5.6-8.4	---	----------	----			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
							K	T		
	In	In/hr	In/in	pH	Mmhos/cm					Pct
SoF*:										
Sansarc	0-4	0.06-0.2	0.08-0.12	6.6-8.4	<2	Very high	0.37	2	4	1-2
	4-13	0.06-0.2	0.08-0.12	7.4-8.4	<2	Very high	0.37			
	13-60	---	---	5.6-8.4	---	---	---			
Boyd	0-5	<0.2	0.10-0.14	6.6-8.4	<2	Very high	0.37	4	4	2-4
	5-23	<0.2	0.08-0.12	6.6-8.4	<2	Very high	0.37			
	23-31	<0.2	0.08-0.12	6.6-8.4	<2	Very high	0.37			
	31-60	---	---	---	<2	Very high	---			
SrF*:										
Sansarc	0-4	0.06-0.2	0.08-0.12	6.6-8.4	<2	Very high	0.37	2	4	1-2
	4-13	0.06-0.2	0.08-0.12	7.4-8.4	<2	Very high	0.37			
	13-60	---	---	5.6-8.4	---	---	---			
Rock outcrop.										
SuE	0-4	0.6-2.0	0.17-0.22	6.6-7.8	<2	Low	0.43	5	4L	1-2
Sully	4-60	0.6-2.0	0.15-0.20	7.4-8.4	<2	Low	0.43			
TaC	0-7	0.6-2.0	0.11-0.15	6.6-7.8	<2	Low	0.20	2	6	1-2
Talmo	7-60	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.10			
TbE*:										
Talmo	0-7	0.6-2.0	0.11-0.15	6.6-7.8	<2	Low	0.20	2	6	1-2
	7-60	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.10			
Betts	0-3	0.6-2.0	0.16-0.18	6.6-8.4	<2	Moderate	0.28	5	4L	1-3
	3-25	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
	25-60	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.37			
Te	0-11	0.6-2.0	0.19-0.22	5.6-7.3	<2	Moderate	0.24	3	6	2-4
Tetonka	11-13	0.2-0.6	0.19-0.22	5.6-7.3	<2	Moderate	0.32			
	13-44	<0.2	0.13-0.19	6.1-7.8	<2	High	0.32			
	44-60	0.06-0.6	0.11-0.17	6.6-8.4	2-8	High	0.32			
Tn*:										
Tetonka	0-11	0.2-0.6	0.19-0.22	5.6-7.3	<2	Moderate	0.24	3	7	2-4
	11-13	0.2-0.6	0.19-0.22	5.6-7.3	<2	Moderate	0.32			
	13-44	<0.2	0.13-0.19	6.1-7.8	<2	High	0.32			
	44-60	0.06-0.6	0.11-0.17	6.6-8.4	2-8	High	0.32			
Chancellor	0-15	0.06-0.6	0.13-0.19	6.1-7.3	<2	High	0.28	5	7	3-6
	15-32	0.06-0.2	0.11-0.19	6.1-7.8	<2	High	0.28			
	32-60	0.06-0.6	0.14-0.20	7.4-8.4	2-4	High	0.28			
Wd	0-7	0.06-0.2	0.13-0.18	7.4-8.4	<2	High	0.28	5	4	3-5
Wendte Variant	7-60	0.06-0.2	0.11-0.17	7.4-8.4	<2	High	0.28			
Wo	0-9	0.2-0.6	0.19-0.22	5.6-7.3	<2	Moderate	0.37	5	7	3-5
Worthing	9-39	0.06-0.2	0.13-0.18	6.1-7.3	<2	High	0.37			
	39-60	0.2-0.6	0.11-0.17	7.4-8.4	2-8	High	0.37			
Wp	0-9	0.2-0.6	0.19-0.22	5.6-7.3	<2	High	0.28	5	7	3-5
Worthing	9-39	0.06-0.2	0.13-0.18	6.1---	<2	High	0.28			
	39-60	0.2-0.6	0.11-0.17	7.4-8.4	2-8	High	0.28			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
AaA, AaB, AaC----- Agar	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
Ab---------- Albaton	D	Occasional	Brief-----	Feb-Nov	1.0-3.0	Apparent	Nov-Jul	>60	---	Moderate	High-----	Low.
An---------- Albaton	D	Frequent----	Very long	Nov-Jun	+.5-2.0	Apparent	Nov-Jun	>60	---	High-----	High-----	Low.
Ao---------- Aowa	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Low.
Ar---------- Arlo	B	None--------	---	---	+1-2.0	Apparent	Oct-Jun	>60	---	High-----	High-----	Moderate.
AsA*: Arlo----------	B	Occasional	Brief-----	Mar-Aug	0-2.0	Apparent	Oct-Jun	>60	---	High-----	High-----	Moderate.
Enet----------	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Moderate	Low.
BbC*: Beadle----------	C	None--------	---	---	>6.0	---	---	>60	---	Low------	High-----	Moderate.
Eakin----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Moderate.
BcA*: Beadle----------	C	None--------	---	---	>6.0	---	---	>60	---	Low------	High-----	Moderate.
Jerauld----------	D	None--------	---	---	>6.0	---	---	>60	---	Low------	High-----	Moderate.
BdF---------- Betts	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Moderate.
BeE*: Betts----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Moderate.
Ethan----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Bn---------- Bon	B	Occasional	Brief-----	Apr-Oct	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Bo---------- Bon	B	Frequent----	Brief-----	Apr-Oct	2.0-6.0	Apparent	Oct-Jul	>60	---	High-----	Moderate	Low.
BsD*: Boyd----------	D	None--------	---	---	>6.0	---	---	20-40	Soft	Low------	High-----	Moderate.
Sansarc----------	D	None--------	---	---	>6.0	---	---	4-20	Soft	Low------	High-----	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
CeB*, CeC*:												
Clarno	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Ethan	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Da*:												
DeGrey	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Jerauld	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Db*:												
DeGrey	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Walke	C	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
DmC*:												
Delmont	B	None	---	---	>6.0	---	---	>60	---	Low	Moderate	Low.
Talmo	A	None	---	---	>6.0	---	---	>60	---	Low	Moderate	Low.
DnA--- Dorna	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Du--- Durrstein	D	Rare	Very brief	Apr-Oct	3.0-5.0	Apparent	Oct-Jun	>60	---	Moderate	High	High.
EaA--- Eakin	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
EbB*:												
Eakin	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Beadle	C	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
EdA*:												
Eakin	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
DeGrey	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
EeB*, EeC*:												
Eakin	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Ethan	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
EmA--- Enet	B	None	---	---	>6.0	---	---	>60	---	Low	Moderate	Low.
EnC*:												
Enet	B	None	---	---	>6.0	---	---	>60	---	Low	Moderate	Low.
Delmont	B	None	---	---	>6.0	---	---	>60	---	Low	Moderate	Low.
EtD*:												
Ethan	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
EtD*:												
Clarno	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
EuC*:												
Ethan	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Homme	C	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
GsE*:												
Gavins	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	High.
Sansarc	D	None	---	---	>6.0	---	---	4-20	Soft	Low	High	Moderate.
Gv	B	None	---	---	>6.0	---	---	>60	---	High	Moderate	Low.
Graceville												
HaA	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Hand												
Hb	B	None	---	---	>6.0	---	---	>60	---	High	Low	Low.
Haynie												
Hc	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Haynie Variant												
HeB	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Henkin												
HgA	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Highmore												
HhB*:												
Highmore	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Eakin	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
HlA*:												
Highmore	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Walke	C	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
HmB*:												
Homme	C	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Ethan	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Onita	C	Occasional	Brief	Mar-Oct	2.5-6.0	Perched	Apr-Jun	>60	---	High	High	Low.
HoA*, HoB*:												
Homme	C	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Onita	C	Occasional	Brief	Mar-Oct	2.5-6.0	Perched	Apr-Jun	>60	---	High	High	Low.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
HuA, HuB---------- Houdek	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Moderate.
Hv---------- Hoven	D	None---------	---	---	+1-1.5	Perched	Mar-Jul	>60	---	Moderate	High-----	Moderate.
InB, IvA---------- Inavale	A	None---------	---	---	>6.0	---	---	>60	---	Low-------	Moderate	Low.
Ix---------- Inavale Variant	A	Frequent-----	Long------	Mar-Dec	0.5-1.5	Apparent	Jan-Dec	>60	---	High-----	Moderate	Low.
LaA, LaB---------- Lane	C	None---------	---	---	>6.0	---	---	>60	---	Low-------	High-----	Moderate.
LoA, LoB, LoC----- Lowry	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
LrF*:												
Lowry------------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Gavins-----------	D	None---------	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	High.
LsD*:												
Lowry------------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Sully------------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
MeE----------	A	None---------	---	---	>6.0	---	---	>60	---	Low-------	Low-------	Moderate.
Meadin												
Mo---------- Mobridge	B	Rare---------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
Mu---------- Munjor	B	None---------	---	---	>6.0	---	---	>60	---	Low-------	Moderate	Low.
OeF---------- Okaton	D	None---------	---	---	>6.0	---	---	8-20	Soft	Low-------	High-----	Moderate.
Oh, Om---------- Onawa	D	None---------	---	---	2.0-4.0	Apparent	Nov-Jul	>60	---	High-----	High-----	Low.
On---------- Onita	C	Occasional	Brief-----	Mar-Oct	2.5-6.0	Perched	Apr-Jun	>60	---	High-----	High-----	Low.
Oo*:												
Onita------------	C	Occasional	Brief-----	Mar-Oct	2.5-6.0	Perched	Apr-Jun	>60	---	High-----	High-----	Low.
Davison----------	B	None---------	---	---	1.5-6.0	Perched	Mar-Jun	>60	---	High-----	High-----	Moderate.
Os*:												
Onita------------	C	Occasional	Brief-----	Mar-Oct	2.5-6.0	Perched	Apr-Jun	>60	---	High-----	High-----	Low.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
Os*:												
Hoven	D	None	---	---	+1-1.5	Perched	Mar-Jul	>60	---	Moderate	High	Moderate.
Ot*:												
Onita	C	Occasional	Brief	Mar-Oct	2.5-6.0	Perched	Apr-Jun	>60	---	High	High	Low.
Tetonka	C/D	None	---	---	+1-1.0	Perched	Jan-Dec	>60	---	High	High	Moderate.
Pg*.												
Pits												
PoA, PoB	D	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Promise												
Pr	B	Occasional	Very brief	Oct-Jun	3.0-6.0	Perched	Oct-Jun	>60	---	High	High	Moderate.
Prosper												
Sa	C/D	Frequent	Brief	Mar-Oct	0-2.5	Apparent	Sep-Jun	>60	---	High	High	High.
Salmo												
Sm*:												
Salmo	C/D	Frequent	Brief	Mar-Oct	0-2.5	Apparent	Sep-Jun	>60	---	High	High	High.
Napa	D	Frequent	Brief	Apr-Jun	0-1.0	Apparent	Nov-Jul	>60	---	Moderate	High	Moderate.
SnF	D	None	---	---	>6.0	---	---	4-20	Soft	Low	High	Moderate.
Sansarc												
SoF*:												
Sansarc	D	None	---	---	>6.0	---	---	4-20	Soft	Low	High	Moderate.
Boyd	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Moderate.
SrF*:												
Sansarc	D	None	---	---	>6.0	---	---	4-20	Soft	Low	High	Moderate.
Rock outcrop.												
SuE	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Sully												
TaC	A	None	---	---	>6.0	---	---	>60	---	Low	Moderate	Low.
Talmo												
TbE*:												
Talmo	A	None	---	---	>6.0	---	---	>60	---	Low	Moderate	Low.
Betts	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Te	C/D	None	---	---	+1-1.0	Perched	Jan-Dec	>60	---	High	High	Moderate.
Tetonka												
Tn*:												
Tetonka	C/D	None	---	---	+1-1.0	Perched	Jan-Dec	>60	---	High	High	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
Tn*: Chancellor	C	Frequent	Brief	Sep-Jun	0-3.0	Perched	Sep-Jun	>60	---	High	High	Moderate.
Wd--- Wendte Variant	D	Occasional	Brief	Apr-Sep	3.0-5.0	Perched	Apr-Jun	>60	---	High	High	Moderate.
Wo--- Worthing	D	None	---	---	+1-1.0	Perched	Jan-Dec	>60	---	High	High	Moderate.
Wp--- Worthing	D	None	---	---	+3-0.5	Perched	Jan-Dec	>60	---	High	High	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--ENGINEERING INDEX TEST DATA

[Dashes indicate data were not available. NP means nonplastic]

Soil name, report number, horizon, and depth in inches	Classification		Grain-size distribution									Liquid limit	Plasticity index	Moisture density	
			Percentage passing sieve--						Percentage smaller than--						
	AASHTO	Unified	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			Max. dry density	Optimum moisture
												Pct		Lb/ ft3	Pct
Agar silt loam: (S75SD-023-002)															
B21t------6 to 10	A-7-6(22)	CL	100	100	100	100	100	97	--	35	--	45	20	97	23
C2ca-----38 to 48	A-6(19)	CL	100	100	100	100	100	96	--	37	--	40	19	105	19
Beadle loam: (S76SD-023-004)															
A1--------0 to 6	A-7-6(18)	CL	100	--	100	99	97	91	--	31	--	43	18	90	27
B22t-----10 to 16	A-7-6(20)	CL	100	--	100	100	97	91	--	35	--	44	20	97	23
C1ca-----30 to 36	A-7-6(09)	CL	100	--	97	94	83	58	--	31	--	41	21	110	17
Betts loam: (S76SD-023-001)															
B2--------3 to 9	A-7-6(10)	CL	100	--	97	95	84	62	--	--	--	44	18	101	21
C1ca------9 to 25	A-7-6(10)	CL	100	--	98	96	86	63	--	--	--	42	19	104	20
C3--------43 to 60	A-7-6(11)	CL	100	--	97	95	86	63	--	--	--	43	20	105	19
Bon silt loam: (S76SD-023-014)															
A13------11 to 23	A-6(05)	CL	100	100	100	100	94	64	--	23	--	32	11	104	20
C1-------23 to 38	A-6(04)	CL	100	100	100	100	95	57	--	23	--	29	11	112	16
C4-------50 to 60	A-7-6(22)	CL	100	100	100	100	99	92	--	35	--	44	22	99	22
Boyd silty clay: (S76SD-023-012)															
B2--------5 to 23	A-7-5(49)	MH	100	100	100	99	98	96	--	73	--	84	39	79	39
Cr-------31 to 60	A-7-5(45)	MH	100	100	100	100	92	83	--	65	--	90	45	79	39
Eakin silt loam: (S75SD-023-007)															
B2t-------7 to 16	A-7-6(24)	CL	100	100	100	99	98	95	--	41	--	49	22	95	24
IIC1ca---29 to 36	A-7-6(14)	CL	100	100	97	94	86	69	--	39	--	44	23	105	19
IIC2-----36 to 60	A-7-6(15)	CL	100	100	93	91	84	67	--	39	--	47	25	102	20
Enet loam: (S75SD-023-021)															
B2--------7 to 24	A-6(07)	CL	100	100	100	100	84	61	--	23	--	36	15	103	20
IIC2-----38 to 60	A-1-b(00)	SM-SC	100	100	91	84	42	14	--	8	--	25	5	116	13
Ethan loam: (S75SD-023-019)															
B31-------9 to 18	A-7-6(10)	ML	100	100	97	94	81	59	--	35	--	48	20	96	24
C1ca-----26 to 40	A-7-6(23)	CH	100	100	99	98	93	79	--	56	--	55	27	95	24
Gavins silt loam: (S77SD-023-029)															
AC--------5 to 12	A-6(11)	ML	100	100	100	100	97	87	--	28	--	40	11	89	28
Cr-------17 to 60	A-7-5(11)	ML	100	100	100	100	91	77	--	40	--	44	13	86	30

TABLE 17.--ENGINEERING INDEX TEST DATA--Continued

Soil name, report number, horizon, and depth in inches	Classification		Grain-size distribution									Liquid limit	Plasticity index	Moisture density	
			Percentage passing sieve--						Percentage smaller than--					Max. dry density	Optimum moisture
	AASHTO	Unified	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm				
												Pct		Lb/ ft3	Pct
Hand loam: (S75SD-023-017)															
A---------0 to 8	A-6(09)	CL	100	100	100	100	98	76	--	27	--	37	13	95	24
B3ca------14 to 25	A-7-6(17)	CL	100	100	100	100	99	87	--	39	--	42	18	99	21
C---------25 to 60	A-4(01)	SC	100	100	100	100	96	45	--	21	--	25	10	116	14
Highmore silt loam: (S75SD-023-001)															
B21t-------7 to 12	A-7-6(29)	CH	100	100	100	100	100	97	--	45	--	53	25	95	24
C---------26 to 48	A-7-6(23)	CL	100	100	100	100	100	96	--	41	--	42	22	106	19
IIC-------48 to 60	A-7-6(18)	CH	100	100	99	97	90	70	--	38	--	51	27	102	20
Hoven silt loam: (S75SD-023-010)															
B22t-------6 to 20	A-7-6(25)	CL	100	100	100	100	98	94	--	45	--	48	24	96	24
C1cacs----29 to 42	A-7-6(17)	CL	100	100	96	93	86	75	--	34	--	44	23	105	19
Inavale loamy fine sand: (S78SD-023-015)															
C1---------8 to 32	A-2-4(00)	SM	100	100	100	100	100	24	--	4	--	23	NP	101	21
C2--------32 to 60	A-4(00)	SM	100	100	100	100	100	50	--	8	--	24	1	103	20
Jerauld silt loam: (S75SD-023-014)															
B2t--------3 to 8	A-7-6(27)	CH	100	100	100	100	99	96	--	45	--	51	24	92	26
B3---------8 to 18	A-7-6(28)	CH	100	100	100	99	97	90	--	48	--	52	28	99	22
C---------18 to 60	A-7-6(35)	CH	100	100	98	97	90	77	--	51	--	71	42	93	25
Lane silty clay loam: (S75SD-023-020)															
B22tca---16 to 24	A-7-5(41)	CH	100	100	100	100	99	98	--	63	--	65	35	90	27
C1--------36 to 54	A-7-6(41)	CH	100	100	100	100	99	97	--	63	--	65	36	92	26
Lowry silt loam: (S75SD-023-016)															
Ap---------0 to 7	A-4(09)	ML	100	100	100	100	100	96	--	21	--	33	9	102	20
B2---------7 to 15	A-4(11)	ML	100	100	100	100	100	97	--	21	--	34	10	101	21
C---------22 to 50	A-6(13)	CL	100	100	100	100	100	98	--	31	--	35	12	102	20
Meadin loam: (S75SD-023-003)															
A12--------4 to 10	A-2-4(00)	SC	100	100	96	86	52	26	--	9	--	28	9	121	10
AC--------10 to 17	A-2-4(00)	SM-SC	100	100	93	80	45	20	--	9	--	25	7	124	10
IIC-------17 to 60	A-1-a(01)	SW-SM	100	100	88	61	21	6	--	3	--	20	3	124	9

TABLE 17.--ENGINEERING INDEX TEST DATA--Continued

Soil name, report number, horizon, and depth in inches	Classification		Grain-size distribution									Liquid limit	Plasticity index	Moisture density	
			Percentage passing sieve--						Percentage smaller than--						
	AASHTO	Unified	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			Max. dry density	Optimum moisture
												Pct		Lb/ ft3	Pct
Mobridge silt loam: (S76SD-023-015)															
B22t-----17 to 23	A-7-6(21)	CL	100	100	100	100	100	99	--	35	--	43	19	99	22
C2-------40 to 60	A-7-6(25)	CL	100	100	100	100	100	98	--	41	--	44	23	105	19
Napa silt loam: (S75SD-023-009)															
B2tsa-----4 to 19	A-7-6(36)	CH	100	100	100	100	99	94	--	47	--	60	33	90	27
C1cacs---24 to 33	A-7-6(38)	CH	100	100	100	100	96	90	--	52	--	63	37	92	26
Okaton silty clay: (S76SD-023-006)															
AC--------4 to 12	A-7-5(20)	MH	100	100	100	100	96	78	--	45	--	56	23	92	26
Cr--------17 to 60	A-7-5(27)	MH	100	100	100	100	99	87	--	57	--	58	26	93	25
Onita silt loam: (S75SD-023-012)															
A---------0 to 10	A-7-6(17)	ML	100	100	100	100	98	92	--	33	--	43	16	89	28
B22t-----16 to 30	A-7-6(27)	CL-CH	100	100	100	100	99	96	--	45	--	50	25	99	22
C1ca-----35 to 45	A-7-6(29)	CH	100	100	100	100	98	92	--	45	--	52	28	100	22
Salmo silty clay loam: (S75SD-023-008)															
Asa-------9 to 22	A-7-6(25)	CL-CH	100	100	100	100	98	91	--	39	--	50	25	92	26
Cg-------37 to 60	A-7-6(33)	CH	100	100	100	99	97	92	--	46	--	57	32	95	24
Sansarc clay: (S76SD-023-007)															
A1--------0 to 4	A-7-5(49)	MH	100	100	100	100	98	96	--	69	--	81	40	80	33
Cr--------13 to 60	A-7-5(60)	CH	100	100	100	100	99	97	--	75	--	88	50	85	30
Sully silt loam: (S76SD-023-003)															
A1--------0 to 4	A-4(08)	ML	100	100	100	100	100	96	--	13	--	35	7	89	28
C2-------15 to 60	A-4(09)	ML	100	100	100	100	100	96	--	25	--	33	9	97	23
Talmo gravelly loam (S76SD-023-013)															
IICca-----7 to 60	A-1-A(01)	SW	100	100	85	57	20	4	--	3	--	22	2	124	9

TABLE 17.--ENGINEERING INDEX TEST DATA--Continued

Soil name, report number, horizon, and depth in inches	Classification		Grain-size distribution									Liquid limit	Plasticity index	Moisture density	
			Percentage passing sieve--						Percentage smaller than--						
	AASHTO	Unified	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			Max. dry density	Optimum moisture
												Pct		Lb/ ft3	Pct
Tetonka silt loam: (S75SD-023-011)															
A1--------0 to 7	A-7-5(19)	ML	100	100	100	100	99	95	--	33	--	46	16	85	30
B22t------17 to 31	A-7-6(36)	CH	100	100	100	100	99	96	--	47	--	59	32	96	24
Walke silt loam: (S75SD-023-004)															
B21t------10 to 17	A-7-6(29)	CH	100	100	100	100	100	98	--	51	--	53	25	92	26
IIC2ca---36 to 60	A-7-6(21)	CL	100	100	99	98	92	76	--	44	--	49	28	102	20
Worthing silty clay loam: (S75SD-023-015)															
B2t-------9 to 39	A-7-6(34)	CH	100	100	100	100	99	96	--	51	--	55	31	95	24
B3g------39 to 44	A-7-5(37)	CH	100	100	100	100	100	100	--	59	--	61	30	89	28

TABLE 18.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series]

Soil name	Family or higher taxonomic class
Agar	Fine-silty, mixed, mesic Typic Argiustolls
*Albaton	Fine, montmorillonitic (calcareous), mesic Vertic Fluvaquents
Aowa	Fine-silty, mixed (calcareous), mesic Mollic Ustifluvents
Arlo	Fine-loamy over sandy or sandy-skeletal, mesic Typic Calciaquolls
Beadle	Fine, montmorillonitic, mesic Typic Argiustolls
Betts	Fine-loamy, mixed (calcareous), mesic Typic Ustorthents
Bon	Fine-loamy, mixed, mesic Cumulic Haplustolls
Boyd	Fine, montmorillonitic, mesic Vertic Haplustolls
Chancellor	Fine, montmorillonitic, mesic Typic Argiaquolls
Clarno	Fine-loamy, mixed, mesic Typic Haplustolls
Davison	Fine-loamy, mesic Aeric Calciaquolls
DeGrey	Fine, montmorillonitic, mesic Typic Natrustolls
Delmont	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Haplustolls
Dorna	Coarse-silty over clayey, mixed, mesic Fluventic Haplustolls
*Durrstein	Fine, montmorillonitic, mesic Typic Natraquolls
Eakin	Fine-silty, mixed, mesic Typic Argiustolls
Enet	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Pachic Haplustolls
Ethan	Fine-loamy, mixed, mesic Entic Haplustolls
Gavins	Loamy, carbonatic, mesic, shallow Typic Ustorthents
Graceville	Fine-silty, mixed, mesic Pachic Haplustolls
Hand	Fine-loamy, mixed, mesic Typic Haplustolls
*Haynie	Coarse-silty, mixed (calcareous), mesic Mollic Udifluvents
Haynie Variant	Coarse-silty, mixed (calcareous), mesic Typic Udifluvents
Henkin	Coarse-loamy, mixed, mesic Udic Haplustolls
Highmore	Fine-silty, mixed, mesic Typic Argiustolls
Homme	Fine-silty, mixed, mesic Typic Haplustolls
Houdek	Fine-loamy, mixed, mesic Typic Argiustolls
Hoven	Fine, montmorillonitic, mesic Typic Natraquolls
Inavale	Sandy, mixed, mesic Typic Ustifluvents
Inavale Variant	Sandy, mesic Typic Psammaquents
Jerauld	Fine, montmorillonitic, mesic Leptic Natrustolls
Lane	Fine, montmorillonitic, mesic Pachic Argiustolls
Lowry	Coarse-silty, mixed, mesic Typic Haplustolls
Meadin	Sandy-skeletal, mixed, mesic Entic Haplustolls
Mobridge	Fine-silty, mixed, mesic Pachic Argiustolls
Munjor	Coarse-loamy, mixed (calcareous), mesic Typic Ustifluvents
Napa	Fine, montmorillonitic, mesic Typic Natraquolls
Okaton	Clayey, montmorillonitic (calcareous), mesic, shallow Typic Ustorthents
*Onawa	Clayey over loamy, montmorillonitic (calcareous), mesic Mollic Fluvaquents
Onita	Fine, montmorillonitic, mesic Pachic Argiustolls
Promise	Very-fine, montmorillonitic, mesic Vertic Haplustolls
Prosper	Fine-loamy, mixed, mesic Pachic Argiustolls
Salmo	Fine-silty, mixed (calcareous), mesic Cumulic Haplaquolls
Sansarc	Clayey, montmorillonitic (calcareous), mesic, shallow Typic Ustorthents
Sully	Coarse-silty, mixed (calcareous), mesic Typic Ustorthents
Talmo	Sandy-skeletal, mixed, mesic Udorthentic Haplustolls
Tetonka	Fine, montmorillonitic, mesic Argiaquic Argialbolls
Walke	Fine, montmorillonitic, mesic Glossic Natrustolls
Wendte Variant	Fine, montmorillonitic (calcareous), mesic Vertic Fluvaquents
Worthing	Fine, montmorillonitic, mesic Typic Argiaquolls

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